ENGINEERING NEWS-RECORD

MARCH 11, 1943

SINGLE-WALL
OUSE ASSEMBLY

ROADS UNDER
AR RESTRICTIONS

GEST PLATE GIRDER
BRIDGE IN U. S.

RPS OF ENGINEERS'
QUIPMENT POOL

ENTRICALLY-LOADED
COLUMN DESIGN

VER CONSTRUCTION
IN BAD GROUND

Laminated timber columns of 1-in. boards carry the massive trusses in this aircraft assembly plant.—See p. 86

MULTI PLATE BRIDGES Have Gone to Sea

Now it's a "bridge of ships" instead of sturdy, low-cost drainage structures. The metal in ARMCO Multi Plate that serves so dependably under highways and railways now can be supplied only for vital war construction.

Engineers will remember Multi Plate Pipe and Arches for their many peacetime advantages. These structures combine great strength and durability with quick, easy erection by unskilled labor. Special equipment is not needed. The rugged sections come to the job site ready for assembly. An average installation requires only a few days and low-cost, trouble-free service is assured.

It will pay you well to keep sturdy ARMCO Multi Plate in mind even though you may not be able to get it fo your immediate construction needs. After the war it agai will be available for bridges, stream enclosures, larg sewers and special drainage structures. Armco Drainag Products Association, 205 Curtis St., Middletown, Ohio

MULTI ARMCO PLATE

ARMCO MULTI PLATE PIPE AND ARCHES

ENGINEERING NEWS-RECORD

Devoted to Buildings, Sewers, Waterworks, Bridges, Roads, Dams, Foundations, Earthwork, Flood Control, Public Works, Shipbuilding, Irrigation, Canals, Railroads

McGRAW-HILL PUBLISHING COMPANY, INC.

Publication Office: 99-129 North Broadway, Albany, N. Y. ● Editorial and Executive Offices: 330 West 42nd Street, New York

JOHN ABBINK, *Publisher*

WALDO G. BOWMAN, *Editor* **ALBERT E. PAXTON**, *Manager*

Vol. 130 MARCH 11, 1943 No. 10

COMING NEXT

- Construction of the longest continuous plate girder span in the U. S.—Charter Oak Bridge at Hartford, Conn., whose design is described in this issue, imposed several unusually difficult problems due to its 840 ft. length, its flexibility and height above water. These problems will be discussed in the Mar. 25 number.

- Crossing a stream with a pipeline ordinarily is not unusual, but to extend a 36-in. steel water supply line across a river required a 497-ft. section assembled on land, weighted with cast-in-place concrete rings to produce desired deflections, and then pulled into place by tractors. Methods employed will be published in *ENR* for Mar. 25.

- The Marines have engineers, too! And although little publicized, these important specialist troops have been among the first waves in all Marine landings, securing and developing beach heads, building roads, constructing fortifications. What they are, how they fit into the Corps organization, and what their duties are will be told for the first time in an article by one of their officers in the Mar. 25 issue.

LOOKING AHEAD

- Postwar public works planning has gone far beyond the realm of academic discussion in New York State. For almost a year a commission has been at work developing plans and specifications for state projects, and now its activities are to be extended to the municipal field. "Putting Postwar Plans Into Realty", a forthcoming article, which outlines progress made and the manner in which the commission functions, should be a stimulus to similar activity elsewhere.

- A rapid procedure in using the Hardy Cross method in analyzing continuous beams for critical live loading plus dead load will be described by Joseph Zalkin, U. S. Engineer Department. How the method is applied is illustrated, step-by-step, for a 5-span design to obtain maximum positive and negative moments and maximum shears.

PAGE

The Week's Events.......... 85

Reader Comment.......... 92

Editorials.......... 94

Plate Girder Erection at Hartford.......... 96

Army Equipment Pool Aids Contract Work.......... 100

Roads Under War Restrictions—V.......... 103

Wellpoints Eliminate Sheeting for Sewer.......... 109

Inland Waterway for South America.......... 112

Single-Wall System of House Assembly.......... 114

Eccentrically-Loaded Column Design.......... 117

Bridge Paint Maintenance.......... 120

Physical Examinations Pay Dividends.......... 124

From Field and Office.......... 126

Book Notes and Reviews.......... 128

Material Prices.......... 128b

Unit Prices.......... 132

New Aids to the Constructor.......... 136

Manufacturers' Activities.......... 154

New Trade Publications.......... 170

Men and Jobs.......... 178

Meetings.......... 182

News of the Week.......... 190

Construction Reports.......... 199

Number of copies of this issue printed: 35,755

CHANGE OF ADDRESS

McGRAW-HILL PUBLISHING COMPANY
330 West 42d Street, New York, N. Y.

Director of Circulation:
Please change my address on Engineering News-Record

From ....

To ....

Signed ....

The factory above is the latest example of Ryerson Rigid-Frame Construction, Godin Tool and Die Company plant in Detroit — Cooper Construction Company, contracting engineers. The inset shows one of the many operations on reinforcing bars, a part of Ryerson Steel-Service.

Rigid-Frame Construction *Saves Steel* For the War Effort

Rigid-Frame (Reinforced Concrete) Uses Only a Fraction of the Steel Required in Ordinary Construction

Great economies in time, money and critical materials are a part of the latest Ryerson contribution to wartime ingenuity . . . an adaptation of *Rigid-Frame Construction* to a monitor type factory building. Note the absence of longitudinal roof beams and lintels. Even the cranes in these bays are supported by reinforced concrete beams.

Ryerson offers construction steels of all types from stock; also structural fabricating service. A special department for Contractors and Builders features a complete reinforcing steel-service. Every step from estimates to final delivery is coordinated with your needs. Experienced crews handle the cutting and forming to exact specifications. Deliveries are always scheduled with the progress of your work. Each shipment is tagged for quick assembly on the job.

When you contemplate new construction, let us work with you from the beginning. Ryerson may be able to help you save time and money.

WPB EXTENDS USE OF REINFORCING BARS

WPB Conservation Division, under Materials Substitution and Supply, now lists Reinforcing Bars as a Group II Material.

Ryerson Building Products

New billet or re-rolled rail deformed reinforcing rounds and squares conforming to Schedule I of Limitations Order L-211. Steel Spirals complete with channel spacers. Wire Mesh in rolls or sheets for building or road work.

Removable forms for concrete joist construction. Expansion and contraction joints, center strip, etc., for road work. Accessories for concrete reinforcing, safety guards, shelving, grilles, etc.; Ryex Standard expanded metal; Ryex flattened expanded metal; Ryex reinforcing expanded metal; and Ryex Walkway expanded metal.

JOSEPH T. RYERSON & SON, INC.
PLANTS AT CHICAGO · MILWAUKEE · ST. LOUIS
DETROIT · CLEVELAND · CINCINNATI · BUFFALO
BOSTON · JERSEY CITY · PHILADELPHIA

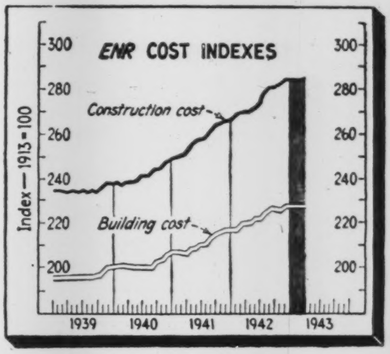
RYERSON REINFORCING STEEL-SERV

ONTHLY CONSTRUCTION BUSINESS SUMMARY

ENR CONSTRUCTION VOLUME AND NEW CAPITAL . . . . FHA MORTGAGES

(,000 omitted)	February 1942 (4 wk.)	February 1943 (4 wk.)	% Change	Two Months 1942 (9 wk.)	Two Months 1943 (8 wk.)	% Change†
Construction	$634,823	$306,242	−52.0	$1,263,603	$533,068	−53.0
te Construction	69,284	36,561	−47.0	120,405	52,059	−51.0
c Construction	565,539	269,681	−52.0	1,143,198	481,009	−53.0
ral	526,187	264,884	−50.0	1,023,287	464,140	−49.0
New Productive Capital	$812,549	$11,041	−99.0	$1,372,463	$15,539	−99.0
te Investment	18,065	11,041	−39.0	116,679	14,039	−86.0
ral (non-federal work)	2,529	....	....	13,829	1,500	−88.0
al (federal work)	791,955	....	....	1,241,955	....	....
A Mortgages Selected for Ap- aisal (Title II)	$61,931	$16,767	−73.0	$116,598	$30,258	−74.0
(Title VI)	82,742	48,912	−41.0	121,364	89,561	−26.0

djusted for difference in number of weeks.



ONSTRUCTION COSTS . . . . . WAGE RATES . . . . PRICES

	March 1942	March 1943	% Change	Change February to March 1942 Feb.	1942 Mar.	%	1943 Feb.	1943 Mar.	%
R Construction Cost dex, 1913 = 100‡	269.71	285.24	+5.8	269.41	269.71	+0.1	283.48	285.24	+0.6
R Building Cost Index, 913 = 100‡	218.88	226.66	+3.6	218.44	218.88	+0.2	226.90	226.66	−0.1

‡*Does not reflect increased costs due to more overtime, lower labor efficiency, delivery delays, etc.*

ENR 20-CITIES' AVERAGE

	March 1942	March 1943	% Change	1942 Feb.	1942 Mar.	%	1943 Feb.	1943 Mar.	%
mon Labor	$0.780	$0.842	+8.0	$0.780	$0.780	0	$0.832	$0.842	+1.2
lled Labor (Av. 3 trades)	1.538	1.606	+4.4	1.536	1,538	+0.1	1.606	1.606	0
cklayers	1.638	1.661	+1.4	1.638	1.638	0	1.661	1.661	0
uctural Ironworkers	1.599	1.700	+6.3	1,599	1.599	0	1.700	1.700	0
rpenters	1.376	1.457	+5.9	1.370	1.376	+0.4	1.457	1.457	0
nent, per bbl	$2.60	$2.61	+0.4	$2.60	$2.60	0	$2.60	$2.61	+0.4
nforcing steel, cwt	2.61	2.74	+5.0	2.61	2.61	0	2.70	2.74	+1.5
uct. steel shapes, base	2.10	2.10	0	2.10	2.10	0	2.10	2.10	0
d, per ton	1.21	1.21	0	1.21	1.21	0	1.21	1.21	0
nber, 2x4 Fir, per M ft.	47.80	51.05	+6.8	47.57	47.80	+0.5	51.47	51.05	−0.8
nber, 2x4 Pine, per M ft.	42.06	44.01	+4.6	41.74	42.06	+0.8	44.03	44.01	*
ck, common, per M	15.28	15.66	+2.5	15.28	15.28	0	15.66	15.66	0
dy-mixed concrete, c.y.	7.20	7.39	+2.6	7.20	7.20	0	7.39	7.39	0
uct. clay tile, 3x12x12	75.91	78.93	+4.0	75.83	75.91	+0.1	78.93	78.93	0
ving asphalt, cars, ton	15.31	15.12	−1.2	15.28	15.31	+0.2	14.88	15.12	+1.6

**Less than .05 percent change.*

ENR INDEX NUMBERS

Base = 100	Construction Cost 1913	Construction Cost 1926	Building Cost 1913	Building Cost 1926	Volume '13	Volume '26
Mar., 1943	285.24	137.11	226.66	122.53	...	...
Feb., 1943	283.48	136.27	226.90	122.66	231	101
Jan., 1943	283.45	136.25	226.87	122.64	172	76
Dec., 1942	283.69	136.37	226.63	122.51	227	100
Nov., 1942	283.64	136.35	226.58	122.48	462	202
Oct., 1942	282.44	135.77	225.90	122.11	421	185
Sept., 1942	281.61	135.37	225.46	121.88	544	238
Aug., 1942	281.61	135.37	225.39	121.84	622	273
July, 1942	277.65	133.46	223.45	120.79	736	323
June, 1942	274.19	131.80	221.18	119.56	752	330
May, 1942	272.30	130.89	220.14	119.00	821	360
April, 1942	271.78	130.64	219.55	118.68	569	249
Mar., 1942	269.71	129.65	218.88	118.32	578	253
Feb., 1942	269.41	129.51	218.44	118.08	507	222
1942 (Av.)	276.31	132.82	222.39	120.22	553	243
1942 (Av.)	257.84	123.95	211.46	114.32	375	164
1940 (Av.)	241.96	116.31	202.81	109.64	269	118
1939 (Av.)	235.51	113.21	197.44	106.73	211	92

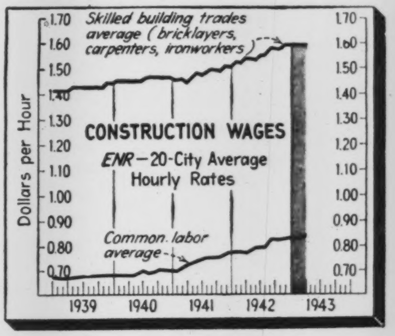
MATERIAL SHIPMENTS . . . . . BUILDING PERMITS

	February 1942	February 1943	% Change	Jan. 1943	% Change Jan.-Feb.
eel (% operating capacity) A. I. S. I.	96.3	98.1	+1.9	97.5	+0.6

	January 1942	January 1943	% Change	Dec. 1942	Jan. 1943	% Change
bricated Structural Steel, tons, A.I.S.C.	167,753	105,869	−36.8	145,280	105,869	−27.2
ment, thous. bbl., U. S. B. of M.	9,115	....	....	8,923	....	....
ilding Permits, Dun & Bradstreet (,000 omitted)	$62,324	$28,854	−53.7	$38,847	$28,854	−25.7

COST OF LIVING INDEXES . . . EMPLOYMENT

	January 1942	January 1943	% Change	Dec. 1942	% Change Dec.-Jan.
ost of Living Index, N. I. C. B.	94.5	101.4	+7.3	101.0	+0.4
ent (Housing) Index, N. I. C. B.	90.1	90.8	+0.8	90.8	0
otal Employment (est.) thous., B. L. S.	34,876	37,906	+8.7	38,942	−2.6
onstruction Employment (est.) thous., B. L. S.	1,762	1,888	+7.2	1,724	+9.4



ENGINEERING CONSTRUCTION CONTRACTS—ENGINEERING NEWS-RECORD—FEBRUARY 1943

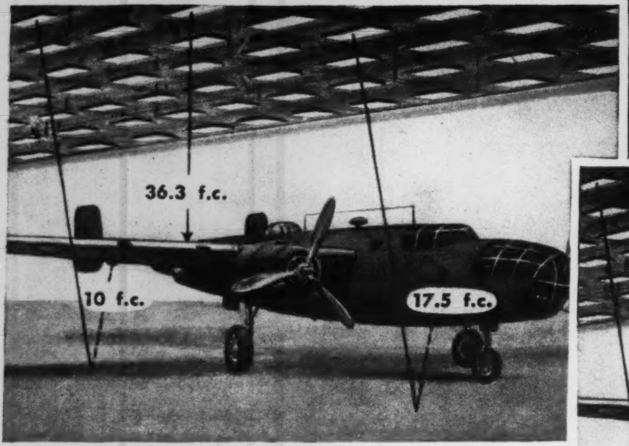
Engineering News-Record *reports projects of the following minimum costs—waterworks excavation, drainage and irrigation,* $15,000; *other public works,* $25,000; *industrial buildings,* $40,000; *other buildings,* $150,000

Four Weeks—Thousands of Dollars (000 Omitted)

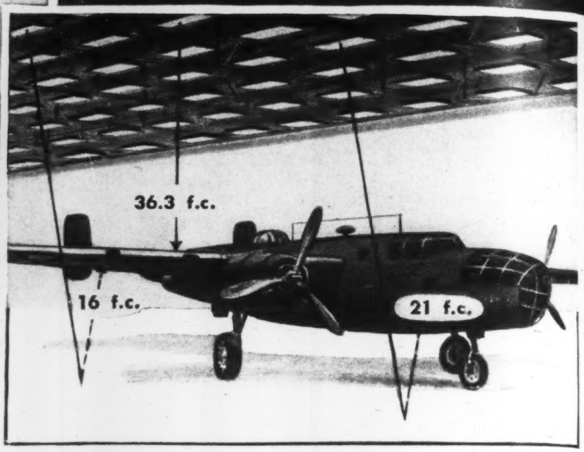
Public Works	New England	Middle Atlantic	South	Mid West	West of Mississippi	Far West	United States February 1943	United States Two Months 1943	United States Two Months 1942	Canada
Waterworks	123	125	1,590	64	1,494	472	**3,868**	**8,352**	16,572	....
Sewerage	124	444	606	27	672	576	**2,449**	**5,092**	12,580	....
Bridges, public	25	28	133	105	548	96	**935**	**2,906**	13,244	50
Earthwork and waterways	....	....	697	....	747	424	**1,868**	**3,256**	146,628	....
Streets and roads	48	700	1,777	....	2,087	1,526	**6,138**	**22,624**	48,513	2,840
Buildings, public	5,979	19,072	50,518	16,817	34,471	45,811	**172,668**	**311,436**	735,854	260
Unclassified, public	6,051	6,239	12,021	2,380	15,392	39,672	**81,755**	**127,343**	169,807	623
Total public	**12,350**	**26,608**	**67,342**	**19,393**	**55,411**	**88,577**	**269,681**	**481,009**	**1,143,198**	**3,773**
Federal government (included in above classifications)	12,242	26,139	66,169	19,286	53,493	87,555	**264,884**	**464,140**	**1,023,287**	....
Private										
Bridges, private	....	....	....	....	....	....	....	**1,500**	105	....
Industrial buildings	934	200	440	20,845	450	310	**23,179**	**28,121**	52,809	417
Commercial buildings	1,354	1,977	645	2,675	771	2,660	**10,082**	**18,456**	53,555	640
Unclassified, public	....	65	135	2,540	404	156	**3,300**	**3,982**	13,936	540
Total private	**2,288**	**2,242**	**1,220**	**26,060**	**1,625**	**3,126**	**36,561**	**52,059**	**120,405**	**1,597**
Total Engineering Construction:										
February, 1943 — 4 weeks	**14,638**	**28,850**	**68,562**	**45,453**	**57,036**	**91,703**	**306,242**	....	....	**5,370**
January, 1943 — 4 weeks	12,279	23,470	60,517	8,888	65,323	56,349	**226,826**	....	....	9,531
February, 1942 — 4 weeks	15,617	78,540	117,572	128,508	134,346	160,240	**634,823**	....	....	9,039
Two Months — 1943	**26,917**	**52,320**	**129,079**	**54,341**	**122,359**	**148,052**	....	**533,068**	....	**14,901**
Two Months — 1942	39,891	219,297	347,080	217,251	212,904	227,180	....	....	1,263,603	16,895

How Light-Reflecting Floors Increase Lighting Efficiency

White-cement floors save light by reflecting it—increase the amount of light on vertical work surfaces and in those hard-to-get-at dark areas.



GRAY-CEMENT FLOOR
Reflection factor 27.4 per cent.



WHITE-CEMENT FLOOR
Reflection factor 44.0 per cent.

LIGHTING INSTALLATIONS in many plants financed by the Defense Plant Corporation are designed to provide about 36 footcandles of light . . . on *horizontal* working surfaces. So far, so good.

But what about other surfaces? What about illumination on vertical faces where so much work must be done? One way to increase the benefit of the investment made in the lighting system is by reflection of light from the floor. And the amount of light a floor will reflect is dependent upon its color. Tests on a 36.3-footcandle installation showed that if the floor is of gray cement, about 17.5 footcandles of light will fall on vertical surfaces. But if the floor is of light-colored concrete made with Atlas White portland cement, about 21.0 footcandles of light will fall upon these surfaces . . . a 20% increase! Compared with a still darker floor, the increase would be even more.

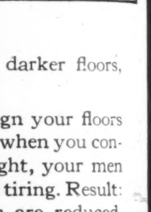
These light-reflecting floors also increase the amount of light on undersurfaces to an even greater extent. Tests on this same installation showed that compared to gray-cement floors, white-cement floors reflect 61% more light onto undersurfaces. Compared with still darker floors, the increase would be much more.

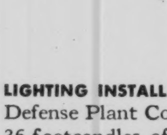
These figures show why you should design your floors to be a part of your lighting system. And when you convert your floors into giant reflectors of light, your men on the job see better . . . work longer without tiring. Result: errors, accidents, spoilage and shutdowns are reduced, and quality and quantity of production goes up.

Mail this coupon today for your copy of "Light from Floors," a new 24-page book containing installation photos, charts, case studies, cost and maintenance data. Universal Atlas Cement Company (United States Steel Corporation Subsidiary), Chrysler Building, New York.

• • •

OFFICES: *New York, Chicago, Philadelphia, Boston, Albany, Pittsburgh, Cleveland, Minneapolis, Duluth, St. Louis, Kansas City, Des Moines, Birmingham, Waco.*





ATLAS WHITE CEMENT

FOR LIGHT-REFLECTING FLOORS

Universal Atlas Cement
Company, Chrysler Building,
New York, N. Y.

Please send me copy of new book, "Light from Floors."

ENR-F-

Name__________

Position__________

Company__________

Address__________

The Week In Engineering and Construction

ENGINEERING NEWS-RECORD • MARCH 11, 1943 • VOLUME 130 • NUMBER 10

Interest in postwar work renewed in Congress

Legislation introduced to finance preparation of plans for postwar construction. Twenty-five states have submitted postwar road plans to the PRA.

Renewed interest in Congress in building up a reserve of projects that may be put under construction quickly after the war is shown by legislation recently introduced into that body. A bill introduced into the House by Representative A. Lynch (*ENR*, March 4. p. 321) would set up a fund of $100,000,000 for loans to federal, state and local agencies for advance preparation of plans, and there is now pending in the Senate a resolution to set up a committee to explore the subject of postwar economy and planning broadly, going into the field of private as well as public undertakings.

Actual road plans

Meanwhile, specific information as to postwar plans come from Major General Philip B. Fleming, head of the Federal Works Agency, who, on March 1, announced that 22 states have taken up $3,631,000 of the $10,000,000 provided by Congress under the Defense Highway Act of 1941 to be allocated to the states on a 50-50 basis to defray the cost of postwar planning. States now doing such planning are Alabama, California, Idaho, Illinois, Kansas, Kentucky, Louisiana, Maine, Massachusetts, Mississippi, Missouri, Nevada, New Hampshire, New Jersey, New York, North Carolina, Ohio, Oregon, Pennsylvania, Vermont, Washington and West Virginia. Three other states, South Carolina, South Dakota and Nebraska have programs that are being considered by the Public Roads Administration.

Estimated construction cost of this work, based on 4 percent preliminary engineering, would be $175,775,000. The projects include 7 urban limited-access highways, 9 rural limited-access highways, 40 major city arteries, 80 alternate routes around cities and 85 major rural highways.

Thomas H. MacDonald, head of the Public Roads Administration, in commenting on this program, said that plans for nearly $500,000,000 of work are rapidly developing. This would amount to nearly two years work under the normal federal-aid road program.

Large road program proposed

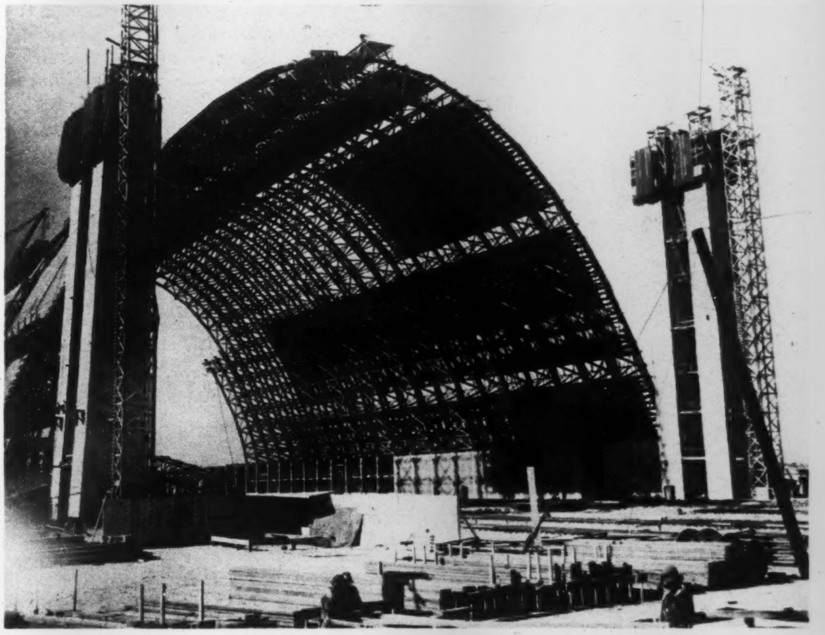
A far more grandiose scheme, cover-

(*Continued on p.* 90)

Many states planning road equipment pools

Forty-two states have reported to the Governmental Division of the War Production Board that they are working on plans for the pooling of road equipment (*ENR*, March 4, p. 321) and the plans of 13 states have been approved by the division.

In urging the states to set up these pools, the Governmental Division points out that practically no new equipment will be available in the near future, hence the maximum use of existing equipment will be necessary if current needs are to be met. The division is anxious to have pooling arrangements set up on a voluntary basis, as it is not its policy to use the WPB's almost unlimited powers arbitrarily.



Blimp hangar of fire-resistant wood

Largest of the timber structures used in war projects are the 246-ft. span. 171 ft. high hangars for Navy patrol blimps (ENR Oct. 22, 1942, p. 576). Each of several hangars being built throughout the country uses 3,000,000 b. ft. of fire-resistant lumber of which 750,000 b. ft. are represented by heavy timbers in the arch frame.

Hangars have 51 arch-frames, spaced 20 ft. c. to c. to provide a clear length of 1,000 ft. Concrete pylons at the ends of the structure support a heavy timber box girder for top guides of the six-leaf 120 ft. high, segmental steel doors.

The design of the structure was made by the Bureau of Yards and Docks of the Navy. Construction is being done by contractors using widely different methods of erection at different locations. Some of these methods will be described in early issues of News-Record.

Frame for world's largest timber factory completed

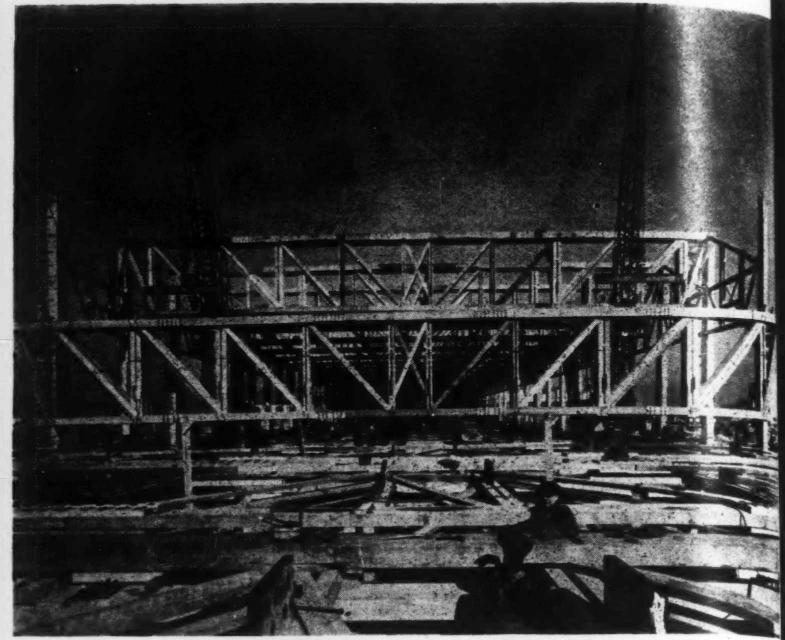
Completion of the framework, on Feb. 22, of what is claimed to be the largest factory building in the world constructed of timber was marked by ceremonies at which the first facts about this significant structure were released for publication. Designed and built by The Austin Co., Cleveland, under the supervision of the Corps of Engineers, the factory, located near Chicago, will be operated by the Douglas Aircraft Co. in the manufacture of C-54 four-engine army transport planes.

The size of the project is indicated by its requirement of 27-million board feet of timber and by the fact that the main assembly bay is spanned by 150-ft. trusses weighing up to 70 tons each. Jack trusses, which support the ends of these long trusses at a point where the assembly bay intersects another bay at right angles, are of even heavier construction per foot of length than the long trusses. All columns are of glued laminated construction, to reduce the need for solid timbers; the largest ones, made up of two legs separated by spacer blocks, are 17½x34 ⅜-in. in section, and 54 ft. long. Both flat and sawtooth roofs are used.

Major emphasis in the design of the factory was placed on the conservation of critical materials, some 30,000 tons of metal, including 20,000 tons of steel, being the estimated saving. Metal use was confined to nails, ring connectors and steam and sprinkler piping.

Subfloor water and process lines are cement-asbestos; drainage pipes are wood; downspouts are fiber; manhole covers, window sash, powerhouse gratings and similar accessories are wood; toolroom and inspection bays use wood lattice instead of steel netting; ventilating ducts and heater and radiator housings are non-metallic; siding is cement-asbestos and roof flashing is of fabric. Wiring tubes are fiber and plastic, protected for a few feet above the floor level with wood bulwarks. Copper wiring is reduced by 33 percent. Bus ducts are supported on wooden trestles, and plastic-covered power lines to machines are on swinging wooden arms hinged to posts. The fluorescent lighting uses white enameled pressed-wood reflectors instead of ones made of porcelain enameled steel. Copper and aluminum are saved by employing four-lamp instead of two-lamp ballasts in the fluorescent fixtures.

Albert S. Low, vice president and chief engineer of The Austin Co., was in charge of the job, and Major William A. Bonnet was area engineer.



Raising a 150-ft. span truss in world's largest timber factory.

Engineering training offered students by Navy

Students receiving specialized engineering training, under the Navy's college training program, in preparation for Navy commissions, will undertake a course of eight sixteen-week terms, it has been announced. The first two terms will be general, emphasizing college-grade work in mathematics, science, English, history, engineering drawing, and physical education; subsequent terms will offer more specialized studies.

Eligible for the courses will be college men now enrolled in one of the Navy's reserves, high school graduates and seniors from 17-20, and enlisted men in the Navy, Coast Guard, and Marines. Successful candidates will be given a chance to express a preference for a particular branch of study, but won't necessarily get what they ask for. The training program, known as the V-12, will be followed by specialized Naval officer training. During V-12 service, students will have the pay and rating of apprentice seamen.

Applications will be received, through high school principals and college officials, until April 2.

• • •

Arkansas is paid for roads flooded by dam

An agreement has been reached between the Arkansas State Highway Commission and the Corps of Engineers, whereby the State will receive $1,422,000 of federal funds in payment for replacement of U. S. Highway 62 and State Highway 101, which will be made necessary by flooding of the roads when the Norfork Dam reservoir is filled. Highway 62 will be flooded early in May.

After deducting from the $1,422,000 the cost of building and operating a ferry near Henderson for two years following the inundation of the highway, the commission voted to segregate the balance for postwar use.

Charles G. Atkin, new head of engineering firm

Charles G. Atkin, formerly vice-president in charge of engineering for the H. K. Ferguson Co., of Cleveland, Ohio, has been elected president of the Osborn Engineering Co., which was founded in 1892, and which is the oldest engineering firm in Cleveland. The company has acquired a high reputation as consulting engineers, and designers of industrial plants, listing among its clients some of the leading concerns of the middle west. The company is recognized as the foremost authority in the country on the design of stadiums and athletic buildings.

Mr. Atkin is a graduate of Union College of Schenectady, N. Y., class of 1911, and served as a major of artillery in World War I. He came to Cleveland in 1919 as district manager of Lockwood, Greene Engineers, Inc., of New York and joined the Ferguson Company in 1930.

ew York State professional engineers rge early start in postwar plans

ate legislature requested to start planning now for postwar con- ruction. Examinations for engineers-in-training to start in June.

e importance of making plans now postwar construction was urged the state legislature by the New State Society of Professional En- ers in a resolution adopted at its winter meeting held in Albany Feb. 7. A similar resolution petitioned National Society of Professional En- ers to take an active part in stim- ng the planning of necessary public ovement projects throughout the try so that a vast reservoir of such ects will be available to absorb the ions of workers from the military es and the war industries in an or- y manner at the close of the war.

Engineers-in-training

Details of the program of the New York State Department of Education for dividing its engineer license examinations into two parts were presented to the meeting by Irwin A. Conroe, assistant commissioner of the department.

The New York State Education Department has authorized the state's engineers' examining board to begin on June 1, 1943, the examination of young engineers who are applying for license to practice as professional engineers in the state before they have attained the four years of practical experience called for in the state engineer license law. Heretofore, the board has not given the examination in engineering fundamentals until engineers had required sufficient practical experience to permit them to apply for a license.

Applicants for examination as "engineers-in-training" must be at least 21 years of age, must satisfy the present citizenship requirements, must have completed an approved secondary school course of study or the equivalent, and must have endorsements of character and aptitude from three or more registered professional engineers who are personally acquainted with the applicant and his record. In addition, the candidate must be a graduate from an engineering school approved by the State Education Department or must otherwise satisfy the educational requirements specified by the board. Candidates successfully passing the preliminary examination will be certified by the department and recorded for a period not exceeding ten years as engineers-in-training. Final examinations may be taken any time within the ten-year period after obtaining the necessary four years of practical experience satisfactory to the board.

The application and examination fee for this preliminary examination is $15, which will be credited towards the $25 fee for the combined examinations and license.

Joint responsibility

Another subject discussed at the meeting was the joint responsibility of engineers and building officials in the development of better building work in our cities, discussion being opened by Walker S. Lee, commissioner of public buildings, Rochester, N. Y.

The board of directors of the society, at its meeting held in advance of the general sessions, gave consideration to numerous amendments to the constitution of the society, amendments that will result in extensive revision of the constitution. Details of the proposed changes are to be published soon.

• • •

Power production to start at Denison Dam, Jan. 1

Announcement is made by Col. William W. Wanamaker, chief of Denison District Army Engineers, that power production at Denison Dam will be started by Jan. 1, 1944. The original program called for production by Sept. 1 of the coming year.

Denison Dam, in Texas on the Red River, is a 50-million dollar flood control and power project.

Construction is about 60 percent complete, and said Colonel Wanamaker, "Unless we encounter unusually severe weather, the embankment in the closure section will reach the 600-ft. elevation by April 1. At this level we can control any flood the size of any occurring during the last 37 years, except the 1908 flood, without damage to any phase of the construction work."

Tons of scrap wire from Tacoma Narrows Bridge

About 4,000 tons of No. 6 high-strength steel wire, with a tensile strength of 120 lb. per sq. in., is being salvaged from the big cables of the ill-fated Tacoma Narrows Bridge, which collapsed on Nov. 7, 1940.

Normally, removal of the old cables and the towers would have been deferred until such time as it could have been done as part of the contract for the bridge to be erected, particularly as cost probably would be somewhat less after the war. The need for steel in the war effort, however, made it expedient to proceed now with the dismantling, even though the construction of a new bridge has been postponed for the duration

Equipment designed with little priorities, (ENR, Jan. 14, p. 35), is unspinning the main cables 24 at a time—a rate that brings the total weight of wire removed to 100 tons per eight hours.

The demolition is being done under a cost-plus-a-fixed-fee contract that was awarded to Philip Murphy and Woodworth & Co. Inc. Work started August 31, 1942, and is to be completed about April 1 of this year. Grover C. McLain (who was superintendent for Roebling Bros.) during spinning of the cables, is superintendent on the demolition contract. Charles E. Andrews, chief consulting engineer, Washington Toll Bridge Authority, is in charge of the work at the Tacoma Narrows Bridge for the state of Washington.

Trans-Isthmus Highway open to public April 1

Panama's Trans-Isthmian Highway, connecting Colon on the Caribbean Sea with the existing concrete highway from Panama City on the Bay of Panama to Madden Dam, will be opened for civilian use on April 1, according to press reports from Panama.

Construction of this 24½-mile section was described in *ENR*, July 17, 1941, p. 96. The highway is a divided-lane road 40 ft. wide with two 10-ft. lanes of reinforced concrete separated by 4-ft. strips of oil-treated gravel. Shoulders are 8 ft. wide. The roadway was designed for the H15 loading of the American Association of State Highway Officials and the H15-S12 loading was used throughout in the design of bridges and culverts. Structures designed for this loading are capable of carrying 55-ton tanks.

Estimated cost of this section from Madden Dam to Colon is $4,000,000. All engineering and construction work was carried out by the Public Roads Administration under an agreement with Panama, construction having been carried out by force account.

• • •

High Point hydro-electric project debt to be paid

After much litigation carried on over a three-year period, the city of High Point, N. C., is now in position to pay off the contractors for services performed on the city's $8,000,000 hydro-electric project, which was due at the time the construction program was suddenly halted several years ago.

The North Carolina Senate has enacted into law a House bill that authorizes the city of High Point, to use federal funds now in its possession to pay off the contractors. The total sum amounts to about $400,000. Payments are to be made as follows: Maxon Construction Co., $364,300.08; Baldwin-Southwark Corp., $39,359.99; Murray & Flood, Inc., $30,368.06; R. E. Faw. Jr., $382.17; and D. F. Dalton, $132.24.

Work on the project was halted in June 1939 when the courts ruled that the city was without authority to erect the power plant. The case was taken to the North Carolina supreme court twice, but each time the ruling against the city was upheld, and after the final adverse ruling in January, 1941, the project was taken over by the Public Works Administration of the Federal Works Agency. Plans were underway to resume construction on the grounds that the project was "essential to the war program" when the idea was abandoned because of the scarcity of vital materials.

JOBS OF THE WEEK

PLANT, Alabama

Reynolds Alloys Corp., Sheffield, awarded contract for plant additions to Andr Weston Co., New York, N. Y. Estimated cost $3,500,000. W. J. Knight & Co., S Louis, Mo., are engineers.

FACILITIES, Hunters Point, Calif.

Yards & Docks, Navy Dept., Washington, D. C., awarded contract to Barrett Hilp, San Francisco, Calif., for additional facilities and dry docks at a co of $3,865,300.

FACILITIES, Bayonne, N. J.

George H. Flinn Corp., New York, N. Y., and Great Lakes Dredge & Dock Co Chicago, Ill., have been awarded contract for additional facilities by Bureau Yards & Docks, Navy Dept., Washington, D. C., at a cost of $4,976,900.

HOUSING, Niagara Falls, N. Y.

Public Housing Authority, New York, N. Y., awarded contract for 1,200 dwellings to Border Building Co., Buffalo; John A. Johnson & Sons, Inc., Brookly and M. Shapiro & Sons, New York, at cost of $2,140,392, and 500 dwellings Bush Construction Co., New York, at $833,500.

BUILDINGS, Kansas

Jones-Hettelstater Construction Co., Kansas City, Mo., has been awarded con tract by U. S. Engineers, Kansas City, for buildings. Estimated cost $1,000,00 Tanner & Mitchell, Horner & Wyatt, Kansas City, Mo., are architects.

HOUSING, Philadelphia, Pa.

Psaty & Fuhrman, Inc., New York, N. Y., awarded contract for the constructi of temporary dwellings, by Philadelphia Housing Authority, Philadelphia. Co tract price $1,479,650. Demchick & Supowitz, G. B. Idell, and H. Shay, Phil delphia, are architects.

HOUSING, Pennsylvania

C. B. Ross, Inc., New York, N. Y., awarded contract for housing by Philadelphi Housing Authority, Philadelphia. Cost $1,454,400. Davis & Dunlap, and Willi Sims and Talbutt, Phila., are architects.

PAVING, New York

Good Roads Engineering & Construction Co., Inc., and William P. McDonal Corp., Flushing, has been awarded contract for paving in Westchester Co. b U. S. Engineers, New York, N. Y. Estimated cost $500,000-$1,000,000.

BUILDINGS, Michigan

U. S. Engineers, Detroit, Mich., awarded contract for dismantling and movin existing buildings, and erecting same, T. O. Type buildings, roads, walks, ele trical distribution Jackson Co. to Owen-Ames-Kimball, Grand Rapids, Mich Estimated $1,000,000.

IMPROVEMENTS, Nebraska

Olson-Assenmacher-Rokahr, Lincoln, has been awarded contract for impro ments, Fillmore County. Estimated cost $2,000,000.

IMPROVEMENTS, Nebraska

Sioux Syndicate, Omaha, Neb., has been awarded contract for improvements and additions, Hall County by U. S. Engineers, Omaha. Estimated cost $2,000,00

IMPROVEMENTS, Nebraska

Patti & McDonald, Kansas City, Mo., has been awarded contract by U. S. Eng neers, Kansas City, Mo., for extensions and improvements, Redwillow Co. Est mated cost $2,000,000.

IMPROVEMENTS, Nebraska

Olson-Assenmacher-Rokahr, Lincoln, Nebr., has been awarded contract for extensions and improvements, in Clay County by U. S. Engineers, Omaha. Est mated cost $2,000,000.

IMPROVEMENTS, Nebraska

U. S. Engineers, Omaha, Neb., awarded contract for improvements and exte sions, Buffalo County to Peter Kiewit Sons Co., Omaha, Neb. Estimated cos $2,000,000.

IMPROVEMENTS, Nebraska

U. S. Engineers, Omaha, Neb., awarded contract for improvements, Thayer County to Lancaster Corp., Omaha, Neb. Estimated cost $2,000,000.

Note—Additional bidding and contract news on many projects large and small appear in the Constructi News section beginning on page 199.

Normandie salvage job enters new stage

Work preparatory to righting the former French liner to be completed in the early summer

Divers are working through the winter to close nearly 400 portholes and several cargo ports, and about 500 openings in the section of the deck now under water on the U.S.S. Lafayette, formerly the French liner, Normandie. The liner burned and overturned at its pier in New York on Feb. 10, 1942.

Work is slow due to the necessity for carrying it on in water so black that it is impossible to see at all. Also, much mud has settled in the ship, most of which must be removed to permit divers to get to the openings.

Portholes are being plugged by a patch that folds to go through the opening and then is held from the inside by toggle bolts while concrete is placed to assist in sealing the openings. Ports are closed by substantial steel and timber frames attached on the outside of the hull and against which concrete is placed.

Transverse bulkheads of timber are being placed between the decks of the ship so that sections may be pumped out individually and movement of water in the hull controlled. The bulkheads are held by bolting two angle irons above and below the deck steel to make a slot into which 8-in. thick, grooved and splined timbers can be slipped. The steel is stripped bare and bolt holes are made by underwater drilling. Timbers span roughly 9 ft. between the decks. Connections are made watertight, and the angles reinforced against movement by forming, with wood, a triangular pocket into which concrete is tremied. When complete, the concrete at each bulkhead is roughly a diamond shape, cut in one direction by the steel deck, and in the other by the timber bulkhead.

This work is slow due to working in the dark in as much as 60 ft. of water. It is expected, however, that the placing of the bulkheads and stopping of openings will be completed by early summer. Pumping will then be undertaken to lighten the ship and lift it from the bottom then, by controlled pumping in planned areas, to slowly right the ship.

Meanwhile, a section of the pier at which the Lafayette lies is to be removed so that it will not interfere with the righting of the ship. Pumps are being installed and pumping plans are being prepared to show stability and metacenters for progressive conditions of the ship as it is pumped out.

All will be in readiness to salvage the 1.029-ft. long, 56,000-ton ship when the divers finish their work. Actual righting is expected to require from a week to a month, followed by a period of several months in drydock to rehabilitate the liner for war service.

The salvage work is being done by the Bureau of Ships of the Navy under Capt. William A. Sullivan, supervisor of salvage; Comdr. B. E. Manseau, acting supervisor of salvage, and Lt. Comdr. C. F. Chandler.

The actual salvage operations are directed by the Marine Salvage Division of the Merritt-Chapman & Scott Corp., for whom Capt. John I. Tooker is general superintendent. The Navy has taken over the Merritt-Chapman & Scott Corp's salvage fleet (*ENR*, Jan. 29, 1942, p. 166) and has an arrangement with the firm for direction of salvage operations under Naval auspices.

• • •

First contracts signed for Army engineer schools

The War Department last week signed its first contracts for training by colleges of young enlisted men. The contracts, all covering engineering training, were made with Purdue, Virginia Polytechnic, Rutgers, West Virginia, U. of Minnesota, A.&M. College of Texas, Oregon State, and Georgia Tech. A large number of colleges have already been approved by a joint Army-Navy-Manpower committee as suitable for training of Army and Navy men, but these are the first to receive contracts.

Meanwhile, prospects lessened that the government will undertake a program of federally-financed training of civilian technicians in the colleges. Such a program has been under consideration ever since the plans for training of military technicians was first announced (*ENR*, Feb. 11, p. 169). However, the War Manpower Commission, it is understood, is increasingly doubtful that it can obtain Congressional approval of its plans.

But while publicly financed technical education thus gets a setback, the possibilities for continuation of some technical training for young civilians on the ordinary private basis were improved by modification of the draft regulations. In an amendment to its Occupational Bulletin No. 11, the Selective Service made it possible for young men to start accellerated courses of college grade without being drafted.

Previous regulations have permitted draft boards to defer undergraduate and graduate students in engineering subjects provided they were in good standing and had completed at least a year of their course. Under the new regulation, any student doing promising work in an engineering subject may be deferred if his course of study will be completed by July 1, 1945.

New York takes action on postwar market facilities

New York City's capital outlay budget for 1943 will be amended to provide funds at once for engineering and architectural services in designing a primary terminal market that will cost "several millions of dollars", according to Mayor F. H. La Guardia.

In making this announcement on March 7, the mayor said that he had named a committee, consisting of Irving V. A. Huie, commissioner of public works, Daniel P. Wooley, commissioner of markets, Robert Moses, commissioner of parks and Walter P. Hedden, of the Port of New York Authority, to recommend the type and site of the new market. Actual construction of the new project to facilitate handling of fruits and vegetables, which is to be the largest of its kind in the country, might have to await the end of the war, in which case it will be added to the city's already big list of postwar construction projects.

Hope for federal aid

The postwar public works agenda in New York City, which now calls for preparing plans and specifications for about $680,000,000 of construction, has been praised by President Roosevelt. In a letter to the mayor the President expressed the hope that the "pioneering" being done by New York City would make the Congress more favorably inclined toward providing federal aid for similar postwar planning in cities and states.

Legislation to authorize federal appropriations for preparation of detailed public works plans by municipalities failed to pass last year, but is now up again for Congressional action.

• • •

Special water rate for Victory garden patrons

After a year of experience with special water rates for victory gardeners, Los Angeles can add its approval to the request of Secretary of Agriculture Claude R. Wickard that every city and suburban family with available ground, join in the 1943 victory garden program. Los Angeles reports that the special water rates announced in *Engineering News-Record*, April 9, 1942, p. 527, have already given an important lift to the food supply problem. Last year more than 17,000 victory gardeners in that city qualified for the rebate plan and their savings on water bills totaled $51,000.

News of the Week
Continued on p. 190

Interest in postwar work renewed in Congress

(*Continued from* p. 85)

ing postwar highway work, has been proposed to the roads committee of the House of Representatives by the American Association of State Highway Officials, and was well received. The association urged that Congress immediately authorize a billion-dollar-a-year road program covering the three years following the end of the war. It is proposed that the authorization would be on the same basis as that used heretofore in authorizing appropriation of federal-aid highway funds. Thus the states would be enabled to proceed immediately to extensive advance work.

In addition to this work by the PRA, the pending appropriation for the Federal Works Agency contains a half million dollars for advance engineering on the monumental type of public building handled by the Public Buildings Administration.

The bill introduced into the House by Representative Lynch covers all types of public works. It would authorize appropriation of $25,000,000 for the use of federal agencies in planning for federal projects and $75,000,000 for projects sponsored by local agencies. The latter would be expected to contribute 25 percent of the cost.

• • •

Charles T. Main, builder of industrial plants, dies

Charles T. Main, founder of the industrial engineering firm of Chas. T. Main, Inc., Boston, died at Winchester, Mass., March 6, in his 87th year. A graduate of Massachusetts Institute of Technology in the mechanical engineering class of 1876, Mr. Main entered the industrial building field in New England after a few years of teaching. Subsequently he expanded his activities to include power development and more recently, valuation work. In 1893 he became a member of the firm of Dean & Main, and in 1907 set up his own organization. He was a past president of the Boston Society of Civil Engineers and an honorary member of the Institute of Consulting Engineers.

• • •

Two bridges to be raised over Tennessee River

In order to maintain traffic routes across the Kentucky Reservoir, which the Tennessee Valley Authority will create by erection of the Gilbertsville, Ky., Dam, two bridges over the Tennessee River will be raised.

Eggners Ferry Bridge, carrying U. S. Highway 68 between Benton and Cadiz, Ky., will be raised 25 ft., and the Scott-Fitzhugh bridge, carrying State Highway 76 between Paris and Dover, Tenn., will be raised 14 ft.

Raising of the two highway bridges, according to an announcement by Rust Engineering Co., Birmingham, Ala., will be carried out by their organization at a cost slightly under a million dollars. It is understood that this cost is about half the expense that would be required to replace them with new structures.

Gantry cranes of 200-ton capacity, and jacks with capacities of up to 300 tons will be employed on this work, and precast concrete cribbing will be used.

Dock supervisors wanted by Corps of Engineers

Maj. Gen. Milton A. Reckford, commander of the 3rd Service Command, Corps of Engineers, Philadelphia, Pa., announced Feb. 25, that commissions are now being offered by the Corps to men with experience in supervisory work on docks.

Candidates with experience in the practical aspects of engineering, crane operation, divers or contractors' superintendents may win commissions as lieutenants, captains or even higher ranks, according to General Reckford, and those interested should place their applications immediately.

Walter C. Mendenhall, of Geological Survey, retires

Walter C. Mendenhall, director of the Geological Survey, Department of the Interior, retired from active service on Feb. 27. He had been actively engaged as a scientist in the Survey Service for over 48 years.

Beginning in 1892, while still in college, as a teamster for a survey field party at $40 a month, Mr. Mendenhall remained to serve in four of the Survey's five branches, to head two of them and finally to become director in 1931. He had carried out assignments in many of the Eastern and nearly all the Western states, Alaska, and the Hawaiian Islands. He was twice exempted by President Roosevelt for one year each from compulsory retirement for age after he was 70 years old.

Dr. Julian D. Sears, now administrative geologist, will replace him temporarily as acting director.

News of the Week
Continued on p. 190

Scrap iron collection nets 14,800,000 tons

Scrap collections of iron and steel during the last six months of 1942 were 95.7 percent of the national quota of 17,000,000 tons. This information was announced by Paul C. Cabot, director of the Salvage Division, War Production Board, Mar. 1.

A total of 14,800,000 tons of scrap, iron and steel combined, were shipped to consuming mills and nearly 1,500,000 net tons were in the hands of suppliers ready for shipment to consumers. Total of available stocks of purchased scrap on Dec. 31, 1942, amounted to 6,160,000 net tons which, together with 1,600,000 net tons of domestic scrap, brought total visible stocks to 7,760,000 net tons at the end of the year. This inventory was substantially in excess of the 7,000,000 net tons of stocks, which was the objective set for last summer.

For the last half of 1942, Vermont, with 162.9 percent of quota, topped the list of states on shipments and suppliers' inventories. New Jersey, with 136.8 percent of quota was the leading state in terms of actual shipments to mills.

• • •

Seabees to dedicate new training center

A new training center for the Seabees, U. S. Navy Construction Battalions, at Davisville, R. I., will be dedicated April 4. It will be named in honor of the late Rear Admiral Mordecai T. Endicott, "father" of the Civil Engineering Corps of the Navy.

Accommodations are provided for ten battalions in addition to the station force, a total of about 13,000 men.

Rear Admiral Endicott, one of the first civil engineer officers of the Navy, was commissioned a commander in 1881 when civil engineers were first given relative rank with naval officers. He was one of ten officers, and second on the list who left civilian status to become part of the navy at that time.

In 1898 he was made chief of the Bureau of Yards and Docks with the relative rank of Commodore, the first member of the Civil Engineer Corps to hold that rank—changed to Rear Admiral in 1899 when relative rank was abolished and civil engineers were given the same status as other naval officers. He continued as chief of the Bureau until 1906, when he was retired, but continued to serve on special duty assignments until more than three years later. In 1917 he returned to the service on special duty in the Bureau, and retired in 1920 at the age of 76.

Death came to this distinguished civil engineer on Mar. 5, 1926.

OBITUARY

Andrew H. Harkness, one of Canada's leading structural engineers, died suddenly at his home in Toronto Feb. 28 at the age of 70. Senior member of the consulting firm of Harkness and Hertzberg of Toronto, Mr. Harkness had been responsible for the structural work of many of Canada's leading buildings, including the Sun Life Building, Montreal, largest office building in the British Empire, the Parliament buildings at Ottawa, the Canada Life Building in Toronto, and many others. In 1935 he received the highest award for outstanding merit in his profession, the Sir John Kennedy medal of the Engineering Institute of Canada.

Fred T. Williams, 66, Sanford, Fla., city and county engineer, died Feb. 26 at Orlando. Mr. Williams was one of the founders of the Florida Engineering Society and served as director of the Waterways and Good Roads Commission of Seminole County.

Frank J. Eager, 65, died Feb. 27 at Sudbury, Ont. Mr. Eager at one time served as an engineer on construction of subway facilities at Boston, Mass., and was widely known in mining engineering circles.

Eli Abbott, Sr., 73, city engineer of Greenwood, Miss., who had been in charge of most of the major engineering projects in Leflore County for the past 27 years, died Feb. 12.

William H. Geisler, 59, died Feb. 28 at Philadelphia, Pa. Mr. Geisler was a graduate civil engineer of the University of Pennsylvania in the class of 1906.

Henry E. Gabriels, Sr., 57, former city manager of Watervliet, N. Y., and one-time commissioner of public works and city engineer of Cohoes, N. Y., died Mar. 7 at Glens Falls, N. Y.

CONTRACTS AND CAPITAL

CIVIL ENGINEERING construction volume for the week, $90,400,000, is 5 percent higher than in the preceding week, but is 32 percent below the total for the corresponding 1942 week. Public construction tops last week by 7 percent due to the 10 percent gain in federal work. Private work, however, is 16 percent below a week ago. Comparisons with the 1942 week reveal public volume 29 percent lower; private work down 63 percent; and federal construction off 24 percent.

The current week's construction brings 1943 volume to $709,277,000, an average of $70,928,000 for each of the ten weeks of the year. On the weekly average basis, 1943 volume is 49 percent below the $1,542,271,000 reported for the eleven-week period last year. Private work, $61,893,000, is 56 percent lower, and public work is down 49 percent when adjusted for the difference in the number of weeks.

In the classified construction groups, gains over last week are in bridges, streets and roads, and unclassified construction. Increases over the 1942 week are in sewerage, and unclassified construction.

New capital for construction purposes for the week totals $29,720,000, an increase of 377 percent over the volume for the week last year. The week's new financing is made up of $26,632,000 in state and municipal bond sales, and $3.088,000 in government loans for public housing.

New construction financing for the year to date, $58,759,000, is 95 percent below the $1,382,371,000 reported for the opening eleven-week period a year ago.

CONTRACTS

(Thousands of dollars)

	Week Ending Mar. 12 1942	Mar. 4 1943	Mar. 11 1943
Federal	$110,048	$76,535	$83,828
State & Municipal	11,052	3,923	2,089
Total public...	$121,100	$80,458	$85,917
Total private..	12,167	5,351	4,483
TOTAL	$133,267	$85,809	$90,400

Cumulative
1943.......(10 weeks)...... $709,277
1942.......(11 weeks)......$1,542,271

Note: Minimum size projects included are: Waterworks and waterways projects, $15,000; other public works, $25,000; industrial buildings, $40,000; other buildings, $150,000.

NEW PRODUCTIVE CAPITAL

	Cumulative 1942 11 weeks	1943 10 weeks
NON-FEDERAL ..	$140,416	$58,759
Corp. Securities.	31,210	....
State & Mun....	95,377	54,171
R.F.C. loans....	13,829	1,500
FPHA loans....	....	3,088
FEDERAL	$1,241,955	....
TOTAL CAPITAL.	$1,382,371	$58,759

ENR INDEX NUMBERS

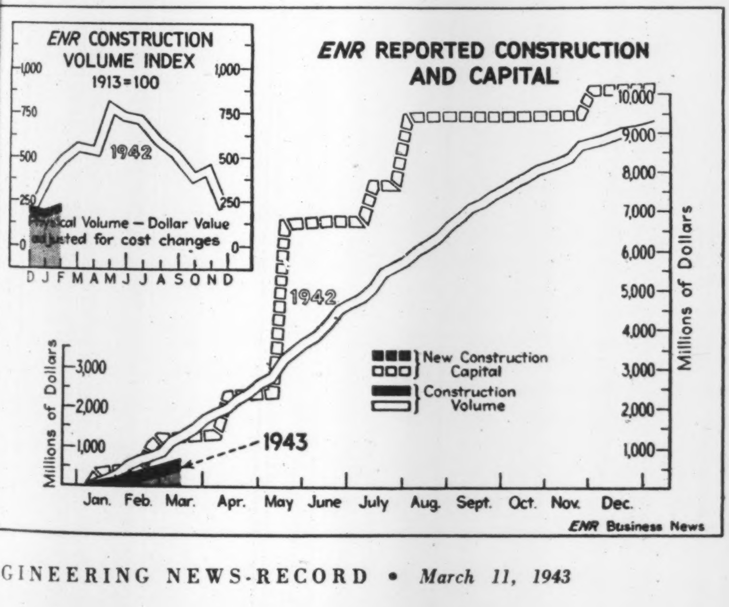
Index Base = 100

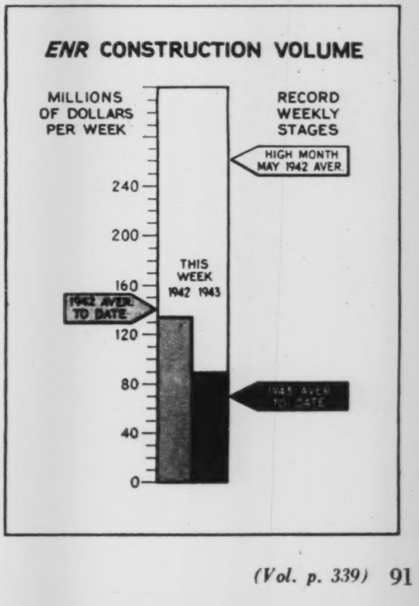
		1913	1926
Construction Cost..	Mar. '43..	285.24	137.11
Building Cost......	Mar. '43..	226.66	122.53
Volume	Jan. '43..	231	101

FHA MORTGAGES

	Week Ending Mar. 7 1942	Feb. 27 1943	Mar. 6 1943
Selected for Appraisal			
Title II....	$16,455	$4,296	$4,732*
Title VI....	$21,271	$10,220	$13,151*

* Subject to revision.





Comment and Discussion

Readers' opinions on matters that concern engineers and contractors

Too Big an Army

Sir: The current discussions of the need for engineers in the Army and Navy have served to call attention to the fact that maximum use is not being made of available talent.

That the Army Engineers are capable of brilliant work, when freed from red tape, has been demonstrated times without number but that much of their present work is hopelessly snarled in red tape is too obvious to be debated. As one who has been employed for several months on a large army cantonment project, I can state positively that it is almost impossible to exaggerate the inefficiency that results on some of these jobs.

However, this condition, tragic as it is, is not so disastrous as another that is being accepted without protest, even with enthusiasm, by the nation at large. That is the program that calls for a total of something more than 10 million men in our armed forces.

At the present time the Axis forces probably number less than 12 million men, all told. The organized armies of the United Nations, not counting numerous guerrilla bands, number at least three times that many. According to a Chinese captain now on duty in this country, China alone has 26 million men now organized, drilled, and lacking only arms and ammunition.

Only two things prevent the extermination of all Axis forces within three months: Lack of munitions and lack of transport.

To keep 1,000 soldiers fighting *effectively* requires the services of at least 10,000 workers in munitions plants. Some ordnance engineers put the ratio as high as 15 to 1.

The entire employable population of the United States is about 65 million. That means that we may be able to supply *properly* an army of 5 or 6 million. No more.

As I write this, our soldiers in Africa are desperately trying to strengthen their positions against an expected attack by the Germans. They outnumber the Axis troops probably 2 to 1, yet they are standing on the defensive because they lack the artillery and ammunition that they should have. And here in America we are going ahead with plans to take another 2 million men from the munitions plants, shipyards and farms and put them to drilling with weapons that should be hanging on the walls of historical museums, or better yet, melted down and rebuilt into modern weapons.

H. H. MUNGER
Manhattan, Kan.

Another View on WPA

Sir: When I read your editorial concerning the WPA (Dec. 17, 1942, p. 837) I felt that I should write and tell you what I thought. And after reading the letters recently in "Comment and Discussion" I could no longer restrain the desire to express my views.

As a town official for the past 15 years, and as one who was in close touch with most of the WPA projects in my town, I think I am in a position to make a fair estimate of the value of WPA.

It seems to me that the worst feature of the WPA was the degradation to which many of the workers were subjected. Men were placed on work for which they were not qualified and knew that the work was not being conducted in a sound and economic manner. I have seen new men placed in with men who had been on WPA for some time, and have heard the older men tell the new men to take it easy and not "kill" the job. I have seen as many as four common laborers on a WPA job and as many as six men in a more or less supervisory capacity watching over the four laborers. This kind of management certainly did not produce morale, of which we heard so much at that time.

I believe that there were thousands of hard-working engineers on WPA doing their very best to make a success of their jobs, but the odds were against them due to politics and pressure from the higher-ups. I know that on many projects on which the federal government paid the cost of most of the labor and the town paid the cost of materials and other incidentals, that it could have been done much cheaper and more satisfactorily by the town without federal aid. It so happens that this town did abandon all WPA projects some four years ago and the town saved money by so doing. I want to state also that the town has taken very good care of all its needy citizens since that time.

Certainly, engineers who were trained and taught to plan for work in an economical way were being forced to reverse their former ideas and had to unlearn all the knowledge that they had acquired over a period of years through experience and common sense.

It seems to me that the problem could have been solved much better by the states and each town or city working out their own plans without expecting aid from the federal government. The old saying that "the people should support the government and not the government support the people" still holds good.

WALTER A. BATES, *Superintendent*
Department of Highways and Bridges
Darien, Conn.

Plan Now to Avoid Work Relief

Sir: Your editorial of Dec. 17, 1942, "The End of WPA", started an informative discussion. The rejoinders of Messrs. Perry A. Fellows and John P. Hallihan and your second editorial, all of which appeared in your issue of Jan. 14, 1943, present interesting, but opposing, views of the functions of government. Your correspondents evidently believe that it is one of the obligations of government to take care of its people. The editor seems to lean to the contrary opinion, that government has no obligation to the citizen other than to protect him, but that rather the citizen's duty is to support the government. Of course, both statements present only part truths. To say that the government should take care of its people is just another way of saying that all of us can handle our problems better than some of us can. And to say that the people are responsible for the welfare of the government is merely an admission that a democratic state is the people, organized for joint action.

The discussion might be concluded and allotted its place in the files, but for one consideration, namely, all experience with work relief projects over a span of ten years has driven home to thinking public officials and alert engineers the absolute necessity for planning for the future. The wastefulness of WPA was not inherent, but was the result of a total absence of carefully considered projects designed for the public welfare as well as for taking men out of the bread lines.

The writer was not a WPA employee, but as an owner's representative had opportunity to observe the workings of that organization. In its beginnings, WPA was obliged to accept and approve any and all projects which promised to offer a living wage to the thousands of the unemployed on the relief rolls of every large city. Any sort of plan on "butcher paper" would suffice. The inevitable result was a multitude of ill-considered jobs of leaf-raking and the like, which implanted firmly in the public mind the idea that frittering away time and materials was a part of the system. The man leaning on his hoe handle became a national symbol of WPA.

Later, when engineers, architects and public officials had had time to digest the essentials of WPA operation, there were evolved higher types of projects which have fitted into the national economy. The early purpose of taking men off the streets became combined with the desire to build something useful, or beautiful, or both. It all depends on which WPA era one is talking about, whether he sides with the editor in stating categorically that "it only fostered a spirit of loafing and getting something for nothing," or with Mr. Hallihan when he says, "The WPA has no apologies to make for its existence". The former assertion is only a half truth and is decidedly unfair. The latter boast overlooks many failures and shortcomings.

We should be a shortsighted people if we failed to grasp the lesson plainly evident from the tribulations of the black years following 1929. We ought to be able to see that the dislocation of labor to follow the cessation of war production and the demobilization of the armed forces will be equally as severe and widespread as that of the days when "prosperity was just around the corner". Unless our public bodies *now* begin to lay plans for postwar construction the whole horrible series of blunders will have to be endured again. It ill becomes us to berate the men who operated the work-relief agencies of the thirties. They were among our outstanding technical and lay citizens and the plan was the best proposed for meeting the emergency.

But these men and women were faced with an impossible task—to put men to useful work when there was no useful work ready for them to do. Will our federal, state and local public bodies learn by the bitter experiences of the late depression, or shall we wallow through another slough of despond? Planning, now, and in detail, is the plainly prescribed antidote for the aches and pains of the after-the-war-period, which otherwise looms as the deepest of all the depressions.

FRANK W. CHAPPELL
Consulting Engineer
Dallas, Tex.

Hays Process Aeration

Sir: Major Rolf Eliassen, in his comments on the writer's article on the Hays process of sewage treatment (*ENR*, Feb. 25, p. 278), emphasizes the importance of efficient aeration in the successful operation of this process. His comparison of typical air requirements for activated sludge and those of Hays plants reported by Kessler and Norgaard demonstrates the inefficiency of some of the air grids used in existing Hays plants.

Too much significance cannot be attached to most of the early operation reports from Hays plants at army camps. More recent reports from these plants, made by operators who have acquired further experience in operation as well as more adequate laboratory equipment, indicate that plants maintaining appreciable dissolved oxygen in the aerators will consistently produce B.O.D. reductions well in excess of 90 percent.

To produce satisfactory results, some of the plants reported by Kessler and Norgaard require over three times the unit amount of air required by other comparable Hays plants. The discrepancies between similar plants, as well as between the Hays process and activated sludge, is for the most part due to differences in the physical means for introducing oxygen into the sewage. As improvements in the method of aeration develop in the Hays process, a better comparison of the overall economics of the process will be possible.

L. B. GRIFFITH
Consulting Engineer and Vice-President
Hays Process Co.
Austin, Texas

Question on Concrete Ships

Sir: Your article, "Building Concrete Ships In Prefabricated Forms" published in the issue of Dec. 31, p. 902, gives information that I am sure many Engineers were glad to get. As I read it several questions came to my mind, the first of which is why such a low steel stress as 12,000 lb.? This seems exceptionally low in view of the requirement of 5,000 lb. per sq. in. for the concrete.

Another question: Why is such a high cement factor required to obtain the design strength? Concrete with such a high cement factor is usually very difficult to place, requiring an excess of total mixing water per cubic yard of concrete. So much cement usually unbalances the mix, causing an excess of fines, with a resulting high volume change during the setting up period.

If the high cement factor is necessary, one wonders if the light weight aggregate is not causing low crushing strengths, thereby partially defeating the purpose for which it is used. Would it not be possible to lower the compressive strength for concrete, increase the steel stress, and obtain a much lighter structure?

L. V. NORRIS
Consulting Engineer
Beaumont, Tex.

Coatings on Concrete Ships

Sir: In the article (*ENR*, Dec. 31, 1942, p. 902) describing the construction of concrete ships, it is pointed out that Inertol was used to coat "the interior concrete surfaces of the ballast tanks." It may be of interest to point out also that Inertol was used on the exterior of the boats below the waterline. The requirements on that part of the surface were much harder to meet than in the salt water ballast tanks.

K. T. FEZER
Inertol Co., Inc.
Newark, N. J.

EDITORIALS

VOLUME 130 NUMBER 10

March 11, 1943

Hard Job Ahead

As war construction, at least in the continental United States, eases off, engineers and construction men are beginning to feel pessimistic about the future. Actually what they are experiencing is the inevitable letdown that follows every exciting, high-pressure assignment. The Army or Navy officer who is returned from the front lines to a desk job in Washington has the same reaction. There is the suspicion that the war is over as far as he is concerned, that he is destined to an ineffectual role from now on. Actually, his new work may be more vital to winning the war than his former field job. More often than not, he quickly perceives this fact, and develops a new enthusiasm. Engineers and construction men are now being retired from the front lines. Compared with day and night work in connection with building war plants, airfields and camps, almost all prospects appear dull. What the construction industry has not yet appreciated is the fact that war is compounded of a lot of dullness and only a little excitement. The exciting phase of war construction may be slowing down, but all signs point to a continuing large volume of important war construction work. Rather than ending, the construction industry's war job is only changing—and getting harder.

Pointing a Lesson

What might be termed geophysical blind spots account for as many difficulties with engineering structures as any other single cause. Unexpected foundation conditions have plagued bridge and dam builders from early times, and poor estimates of weather possibilities have ever been a source of trouble. Such thoughts are engendered by the recent announcement that Mud Mountain Dam, a flood control structure in the state of Washington, has been completed at a cost nearly double that first estimated. The difficulty, it will be recalled, arose from the fact that the earthfill dam, which the Army Engineers planned for the site, had to be changed to a rockfill with a rolled earth core, when it was found that the earth was too moist for proper compaction. The fact that bids on the earth dam were received from reputable contractors indicates that they, too, underestimated the difficulties. In the end the dam was successfully completed as a result of a courageous decision to change the design after work had started, coupled with ingenious processing of the core material by mechanical drying and by use of a huge tent over the construction site. Hindsight would now indicate, however, that the difficulties could largely have been avoided by more careful advance study of the materials and local weather conditions.

Bridge Painting

Bridge painting amounts to a considerable item in the budgets of most highway departments, many city public works bureaus and railroad maintenance-of-way organizations. Too frequently in the past such work has been treated as a routine operation calling for no special consideration. Painting gangs were hired in the spring, paint was purchased on the basis of price rather than desired characteristics, and a list of bridges to be painted was handed to the paint foreman. In more recent years some bridge departments have undertaken to put this work on a more scientific basis. A good example is the California Division of Highways. As described elsewhere in this issue, that division uses the most modern equipment available for steel cleaning and painting, including air compressors, sand blasters, air sprays and even flame cleaners; its paint is prepared to specifications based on long experience. As is to be expected, the results are highly satisfactory. Initial costs to equip and train such paint gangs may be high, but in the long run the investment pays large dividends in reduced painting cost and in longer life, not only for the but also for the structures themselves.

Design Against Panic

Following close upon the German propaganda threat to bomb Eastern United States cities "within a few months," the panic at the entrance to a London subway air raid shelter, which took 178 lives, may be expected to revive interest in American raid protection measures. The direct lessons that can be drawn from the London disaster, however, are obscure; raids on the United States, under present conditions, could only be of the nuisance or token variety, so infrequent, small and widely scattered that a program of shelter building is out of the question. Indirectly, on the other hand, the London tragedy offers an object lessons to designers of all places of public assembly, just as the recent Boston night club fire did. That lesson is that entrance and exits must be designed for panic conditions and not simply for orderly ingress and egress. Pictures of the London subway entrance show it to be of ample width, much wider than many in this country, but it contained no handrails by which persons could support themselves against pushing from above; the wider an entrance, the more handrails it requires. Loud speaker systems, through which guards can give advice and orders to panic-stricken crowds, might also be incorporated in entrance designs. Another improvement would be to eliminate emergency exits that lead into narrow alley passageways or onto steep outside fire escapes that are frightening in themselves. The London and Boston disasters merely emphasize again that it is well to let almost fantastic conditions govern the design of entrances and exits to places of public assembly.

An Essential Industry

HIGHWAYS ARE ESSENTIAL to the war effort, for without well maintained streets and roads it will not be possible to keep our war industries going. That fact would appear to be so self-evident as not to require statement, yet from both the Atlantic and Pacific coasts come reports that state highway departments are losing men so rapidly as to raise serious question concerning their ability to maintain highways in safe operating condition. At its recent meeting, the Association of Highway Officials of the North Atlantic States urged Director McNutt of the War Manpower Commission to advise all draft boards that highway maintenance is an essential industry. In California, C. H. Purcell, director of public works, estimated that the new manpower regulations may reduce the already depleted highway forces by 50 percent. Because of this threatened depletion, California district engineers have been instructed by State Highway Engineer George T. McCoy to prepare manning tables for submission to the War Manpower Commission. Such a step appears to have better possibilities for producing tangible results than memorializing the WMC. Manning tables, giving the rating of men as to the essentiality of their services and the time required to train replacements for them, are used in industry and now have an established place in the manpower set-up. Any state highway department faced with this problem would do well to follow the lead of California.

Equipment Pools

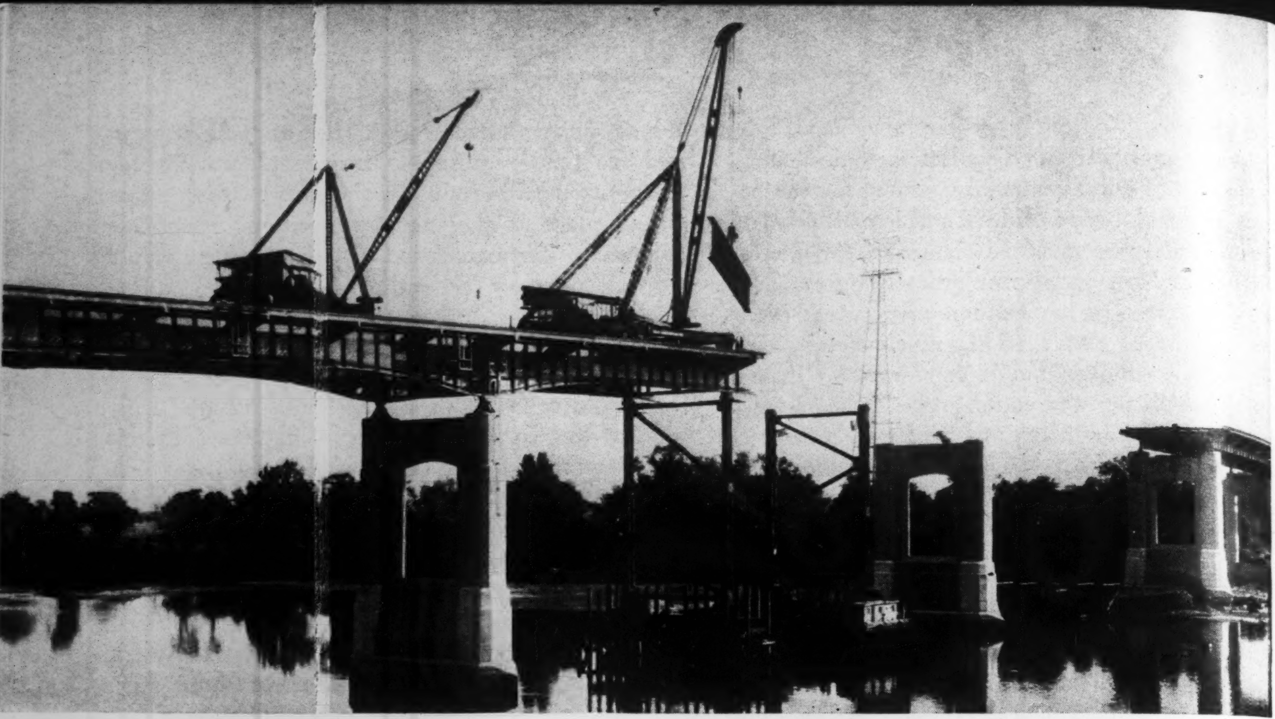
THE EQUIPMENT POOL of the South Atlantic Division of the Corps of Engineers, described in this issue, might be studied profitably by those concerned with pooling state, county and municipal construction machines. The Army Engineers' pool, not the least of whose merits rests in keeping existing contracting and equipment repair organizations in being, makes available to contractors, on a fixed-rental basis, the machines needed for their work, which they cannot procure from other sources. The Army retains the right to reallocate the machines for the best prosecution of the war, but otherwise the contractor operates as with equipment secured through normal rental agencies. Repairs are contracted to established and experienced private shops, enabling the continuance of this essential service through a time of curtailed construction work. Proof of the equity and value of the pool lies in the enthusiastic endorsement of the plan by contractors and by all ranks of the Army Engineers.

Those now engaged in setting up state-wide pooling plans for state, county and municipal road-building equipment (*ENR* March 4, p. 321) have a somewhat different problem, but their exchange of equipment might also be put on a rental basis. Some highway departments now rent the larger and less frequently used pieces of equipment to their subdivisions. Extension of this plan to include cities and counties, and possibly even some local contractors with idle construction equipment, therefore, should not prove to be particularly difficult.

As was stated in our issue of Jan. 28, such pooling, if it is to be successful, must be based on cooperation rather than coercion, hence the advantage of a rental basis that will bring to the owner a cash return for use of his equipment. Also important is a clearinghouse through which requests for equipment must pass. So long as there is not equipment enough to go around, some central state office must decided where the need is greatest.

ENGINEERING NEWS-RECORD WALDO G. BOWMAN, *Editor*
EDWARD J. CLEARY, *Managing Editor. New York:* V. T. BOUGHTON, A. N. CARTER, H. W. HUNT, E. R. DENMARK, E. E. HALMOS, Jr. *Chicago:* H. W. RICHARDSON. *Washington:* PAUL WOOTON, R. B. COLBORN. *San Francisco:* N. A. BOWERS. *Consulting Editors:* F. E. SCHMITT, W. W. DeBERARD
EDITORIAL OFFICES: 330 WEST FORTY-SECOND STREET, NEW YORK, N. Y.

Copyright 1942, by McGraw-Hill Publishing Company, Inc.



Crane of 167-ton capacity erects the 300-ft. central span of the 840-ft. continuous girder on the Hartford, Conn., bridge.

Long Plate Girders in Hartford Bridge

C. H. Gronquist
Associate Engineer of Robinson and Steinman, Consulting Engineers,
New York, N. Y.

***Contents in Brief**—Silicon steel plate girders, 17 ft. deep over the piers, and 11½ ft. elsewhere, are used for the 270-300-270-ft. continuous spans on the Hartford, Conn., bridge. Continuous stringers support the concrete filled I-Beam grid floor. Continuous girders are also employed for the east approach, 500 ft. of which lies on a one-degree horizontal curve. One of the engineers connected with the structure from its inception to completion gives the basic design date, including details of the longest plate girder span in the U. S.*

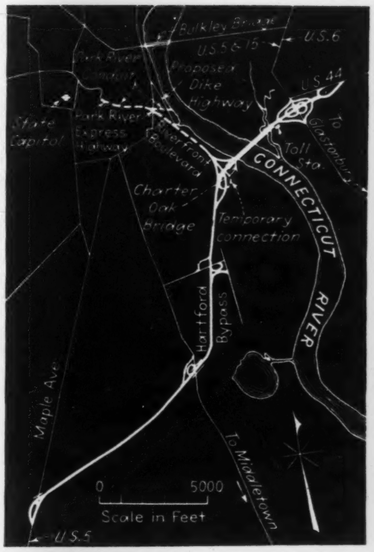
A CONTINUOUS GIRDER span of 300 ft. on the recently completed Charter Oak Bridge over the Connecticut River between Hartford and East Hartford, Conn., the longest span of its type in the U.S., is the focal point of this all-girder bridge. The new structure will ease the traffic congestion of historic Hartford and give readier access to the war production plants of East Hartford. While the bridge is essentially a link in the extension of the Wilbur Cross Parkway, it is also an integral part of the extensive improvement program undertaken in the city of Hartford during the past several years.

This program, in addition to the bridge, includes construction of dikes along both sides of the river to well above the high water mark reached during the devasting flood of 1936, and a highway from the new bridge to the city along the top of one of the dikes. The Park River, which runs through the city to Bushnell Park immediately in front of the state capitol, is being diverted into twin pressure conduits (*ENR*, Jan. 29, 1942, p. 180), and the new road will enter the business district as a four lane separated highway built on top of this conduit. This route gives direct connection to the business district with a minimum of expenditure for right-of-way.

The need for a second bridge over the Connecticut River at Hartford has long been recognized. In 1929, an investigation and report on the necessity for a new bridge was made by Clarence Hudson, consulting engineer, and in 1931 the Connecticut River State Bridge Commission authorized the preparation of plans by Robinson & Steinman, consulting engineers. Plans were drawn for a suspension bridge crossing a short distance north of the location of the recently completed structure and bids were taken on these plans in 1933, but conditions at that time made it impossible to proceed with construction. With the feasibility of toll collection in the state established on the Merritt Parkway, this means of financing the Hartford Bridge project was authorized by legislative action in 1939, and preliminary plans for the new structure and its approaches were commenced. Traffic surveys determined that the total cost of the project, as of 1940, must be kept to $4,200,000 to make it self-liquidating, necessitating that the cost of the bridge proper be restricted to a minimum amount. Estimates of cost for several types of construction indicated that continuous girder design would provide the most economical crossing.

Navigation requirements fixed the size and location of the main river spans of the bridge. The navigable channel, adjacent to the west bank of the river, required a minimum span of 270 ft. and considerations of symmetry and economy determined the remaining span lengths of the main river crossing. Beginning at the Hartford side of the Connecticut River there are 270- 300- 270-ft. girder spans to form a three-span continuous unit. The east approach viaduct consists of two units of four-span continuous girders, the spans nearer the river being 150 ft. each and the rest 125 ft. each, totaling about 1,104 ft. The greater part of the latter unit lies on a 1-deg. horizontal curve.

Approaches on the Hartford side of the river are in the shape of a Wye the south leg of which is made up of simple girder spans of 95 ft. and 110 ft., for a total length of 1,259 ft. Most of this approach is on a 2-deg. horizontal curve. The north approach, giving direct access to the city of Hartford over the Riverfront Blvd. and Park River Express Highway, is sharply curved and is composed of 70 ft. and 105 ft. simple spans totaling 735 ft. in length. The grades on all approaches are 4 percent, and are connected by an 842 ft. vertical curve over the three main spans. A maximum vertical clearance of 90 ft. is provided at the center of the 300-ft. span. The toll plaza and administration buildings are located in East Hartford.



The new bridge is part of a general highway improvement that will take through traffic off the congested city streets and yet provide an express highway into the heart of the city.

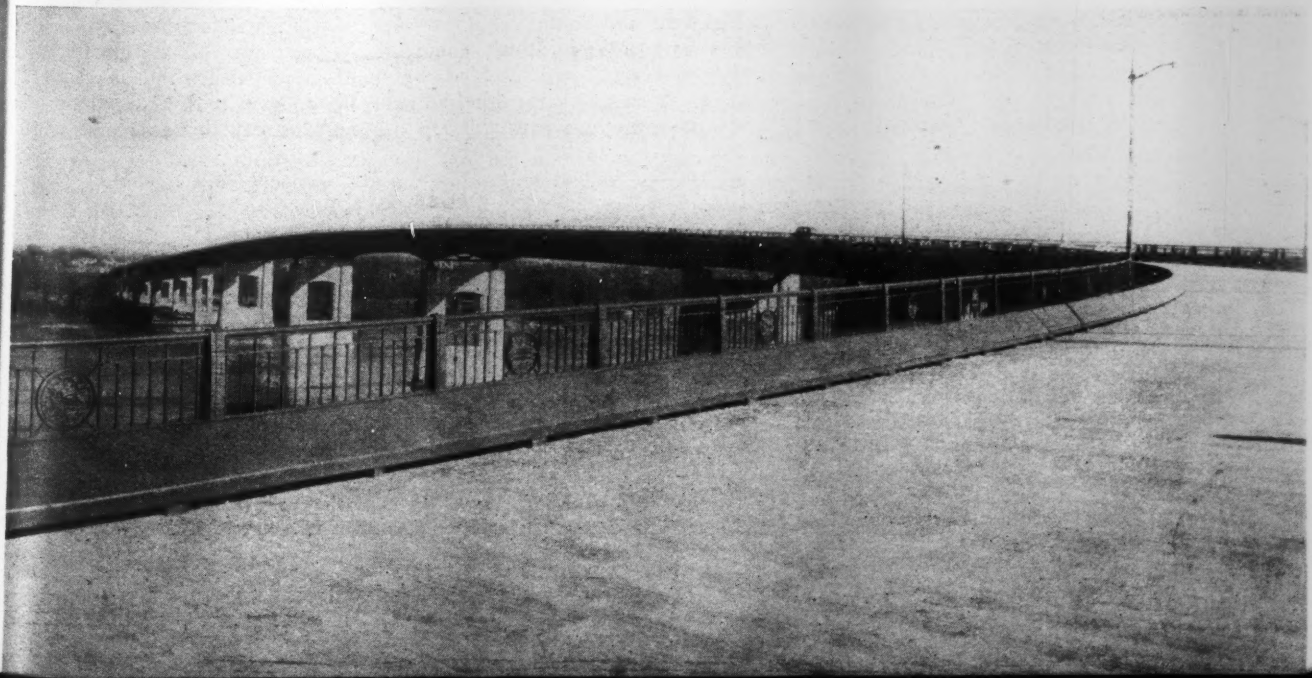
The bed of the river at the bridge site is an unstable muck below which are layers of sand, clay, and hardpan overlying bedrock. Steel H-piles, 14x14½ in. by 73 lb. and 30 to 100 ft. long, were driven to the rock with batter piles used extensively to increase the stability for the high piers required. The foundations for the river piers were placed in the dry in open steel sheet-pile cofferdams. Floating equipment was required at only one pier since the foundations at the ends of the main 840-ft. continuous unit were located on land, and a fill was placed to reach the intermediate pier in shallow water at the east end of the 300-ft. span. The four river piers are built with a solid concrete base, partially faced with sawn granite varying in thickness from 4 to 18 in., and surmounted by a reinforced concrete frame extending to the height required for the girders.

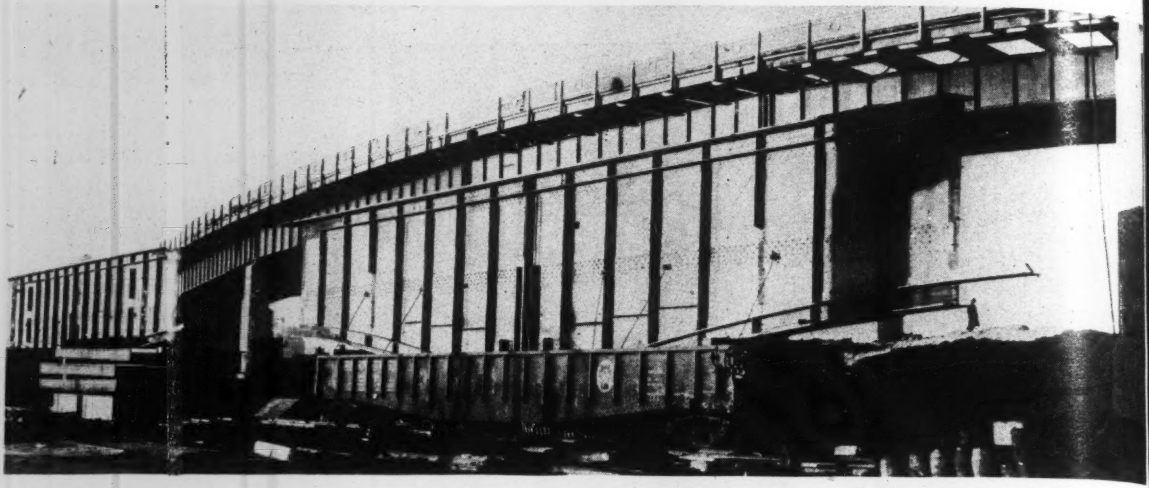
East approach piers

The approach piers, with a few exceptions, are concrete frames supported on two footings resting on piles. These frames are connected by a horizontal strut to increase the stiffness of construction in the area where the longest piles were required. Several of the west approach piers, near the river, were built with solid bases similar to the main pier construction.

Sandy material on the East Hartford shore permitted utilization of a

Over water spans and East Hartford viaduct as seen from sharply curved northwest approach. Charter Oak, the Old State House, the Congregational Church and the Aviation Industry appear in the railing medallions.





Over-pier section of continuous girder 17-ft. deep. The horizontal field splice was necessary for shipping clearance, and in the final erection scheme the section was erected in two pieces.

well-point system instead of the sheet pile cofferdams for subsurface work. Excavation was partly completed, and then the well-point system assembled just above the groundwater level and the material solidified sufficiently by drainage to permit completion of excavation to the pier bottom. Vertical piles were driven first, then a guide frame was welded to them to start the batter piles into the ground on the design 1:5 slope. Batter piles were spliced as the driving proceeded, milled ends being joined by welding.

The toll plaza location at the end of the east approach shortened the length of steel construction from what it might otherwise have been and placed the abutment at a point where the fill was 50 ft. high. To reduce the weight of this abutment and keep the number of piles to a minimum, an abutment of open-frame construction was used. The footings for the several sections of the abutment are connected by two lines of transverse diaphragms.

The roadway cross-section on the bridge, except for the northwest approach, consists of two 24-ft. roadways, separated by a 4-ft. wide center mall. The bridge is designed for H-20 loading.

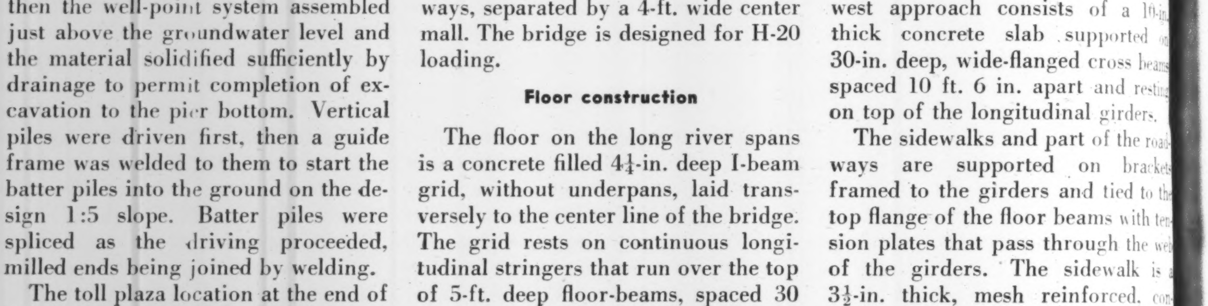
Floor construction

The floor on the long river spans is a concrete filled 4¼-in. deep I-beam grid, without underpans, laid transversely to the center line of the bridge. The grid rests on continuous longitudinal stringers that run over the top of 5-ft. deep floor-beams, spaced 30 ft. c. to c., and these in turn frame between the two lines of main girders. The girders are connected by a tension lateral system, consisting of structural tee sections, at the bottom of the floor beam.

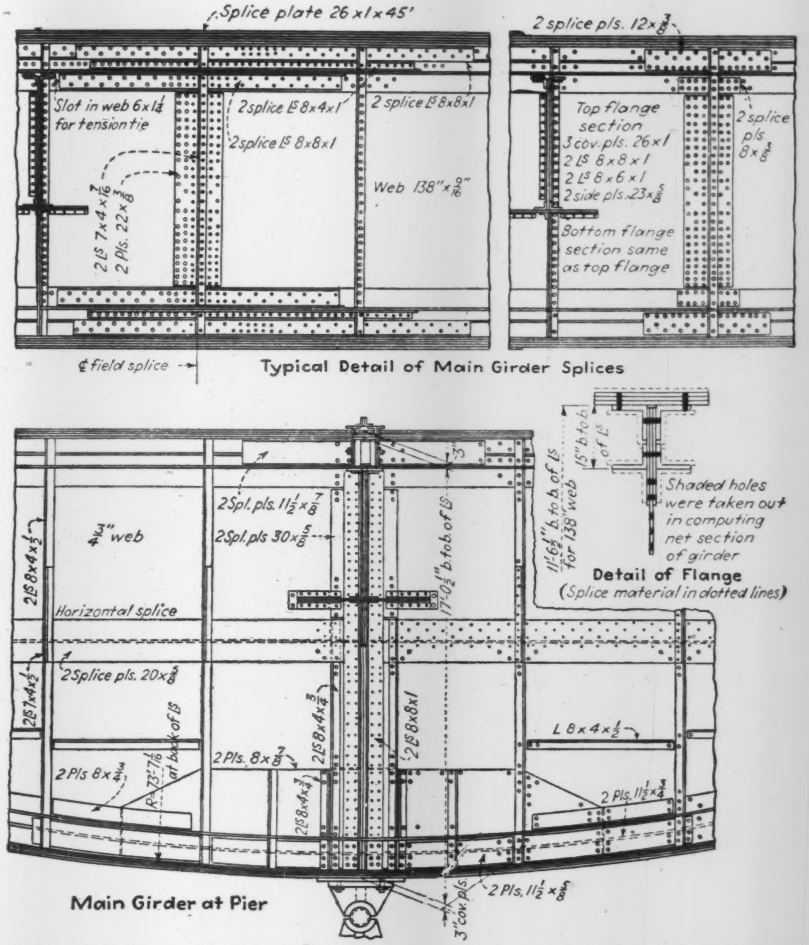
The east and southwest approach spans have a 7¼-in. thick concrete slab, reinforced with welded bar-trusses. Stringers are longitudinal and are continuous over the top of 5-ft. deep floor-beams, spaced at 25 ft. c. to c. The floor construction for the single 24-ft. roadway of the northwest approach consists of a 10-in. thick concrete slab supported on 30-in. deep, wide-flanged cross beams spaced 10 ft. 6 in. apart and resting on top of the longitudinal girders.

The sidewalks and part of the roadways are supported on brackets framed to the girders and tied to the top flange of the floor beams with tension plates that pass through the web of the girders. The sidewalk is a 3½-in. thick, mesh reinforced, concrete slab. Alternate panels of the steel railings are ornamented by 3-ft. circular medallions, depicting four landmarks of Hartford and East Hartford: Charter Oak, the Old State House, the Congregational Church and the Aviation Industry.

The girders of the main spans are of silicon steel with a depth of 11 ft. 6½-in. back to back of outer flange angles except for a distance of 60 ft.


4'
24' roadway
4'
24' roadway
℄ of bridge
Post 7'-6" c.c.
3'-6"
Open
21"
3"
4¼" I-beam grid (Concrete filled)
Field weld
21"
Reinforcing truss 6" c.c.
Post 8'-4" c.c.
18WF47
21WF59
21WF 59
18WF47
18WF55
16WF45
Web 3/8"
5'-0½" bb Ls
2Ls 6x4x9/16
Web 60x3/8
2Ls 6x4x9/16
Manhole for walkway
2Ls 6x4x5/8
Web 60x3/8
2Ls 6x4x5/8
Floorbeam 30' c.c.
Floorbeams 25' c.c.
11'-6½"
Max. thickness of cover plate 3"
Half Cross Section – Main Spans
Half Cross Section – East Viaduct
20'
20'

Concrete filled I-beam grid on the long continuous girder and bar-truss reinforcement on the approach span are features of the roadway design.


Splice plate 26 x 1 x 45'
2 splice pls. 12 x 3/8
Slot in web 6 x 1¼ for tension tie
2 splice Ls 8x4x1
2 splice Ls 8x8x1
2 splice Ls 8x8x1
2 Ls 7x4x7/16
2 Pls. 22x3/8
Web 138" x 9/16"
Top flange section
3 cov. pls. 26x1
2 Ls 8x8x1
2 Ls 8x6x1
2 side pls. 23x5/8
2 splice pls 8x3/8
Bottom flange section same as top flange
¢ field splice
2 Spl. pls. 11½ x 7/8
2 Spl. pls 30 x 5/8
¾" web
2 Ls 8x4x½
Horizontal splice
2 Splice pls. 20 x 5/8
2 Ls 7x4x½
R = 73'-7 1/16 at back of Ls
2 Pls 8 x ¾
2 Pls. 8 x 7/8
2 Ls 8x4x¾
2 Ls 8x4x¾
2 Ls 8x8x1
17'-0½" b. to b. of Ls
3"
L 8x4x½
2 Pls. 11½ x ¾
2 Pls. 11½ x 5/8
3" cov. pls.
11'-6½" b. to b. of Ls for 138" web
15" b. to b. of Ls
Shaded holes were taken out in computing net section of girder

Typical Detail of Main Girder Splices

Main Girder at Pier

Detail of Flange
(Splice material in dotted lines)

Girder details over intermediate pier and at splices near center of 270-ft. span.

either side of the intermediate piers, where the depth gradually increases to 17 ft. $0\frac{1}{2}$-in. over the piers. In this area, web plates of $\frac{3}{4}$-in. maximum thickness are spliced horizontally as well as vertically, and are stiffened by both vertical and horizontal stiffener angles; elsewhere $138\times\frac{9}{16}$-in. web plates with vertical stiffeners are used. Each flange consists of two 8x8x1-in. outer angles and two 8x6x1-in. inner angles against $23\times\frac{5}{8}$-in. side plates. The cover plates are 26 in. wide and vary from 1 to 3 in. thickness, not including the 1-in. splice cover plate where required.

Girder splices

Maximum length of girder shipped was 126 ft. The main girder flange field splices are lap or shingle splices. The riveting for the splices was computed by analyzing the transfer of stress resulting from cuts in material and the taking out of additional rivet holes, much as for truss member splices. The capacities of the various parts of the flange were taken in proportion to their distance from the center of the girder and the actual variation in flange stress across the length of the splice. Rivets of 1-in. dia. were used throughout the main span girders.

The basic unit stress in the flanges of the silicon steel girders was 24,000 psi. near the end piers, and was varied with a straight line reduction over the 270-ft. span to 22,000 psi. at the intermediate piers and over the entire 300-ft. center span. This variation was made to allow for error in reactions and unequal temperature of the upper and lower flanges. The unit stress in the 300-ft. span was further reduced to 18,000 psi. by the use of an additional 100-ft. center cover plate to allow for gross error in reactions, since the flexibility of the exceptionally long girders made adjustment of the reactions by jacking impracticable.

Shop assembly

Adjacent girder sections were assembled in the fabricating shop for reaming of splices in accordance with the alignment provided by marks on stiffeners at each end of the sections. These marks lay on the base line of the no-load, three-span layout, and they were the means of insuring accurate shop assembly. Adjustment of the rockers for plumbness at intermediate piers on both the river and the east approach spans was obtained by providing for welding of base plates to grillages only after erection of the girder on the pier.

The continuous girders of the curved portion of the east viaduct run on chords to the splice points at floorbeams 25 ft. either side of all piers, the floorbeams and brackets providing the necessary framing to resist the resulting torsional moments. All expansion in the east viaduct is concentrated at a single expansion joint at the junction of the 150-ft. and 125-ft. spans near the center of the 1,100-ft. east viaduct. The depths of these carbon steel girders are respectively 10 ft. and 9 ft. and the flanges consist of pairs of 8x8 in. angles and 24-in. cover plates. For the simple spans of the southwest approach 7-ft. girders of silicon steel and similar section are used.

The members of the Hartford Bridge Commission are H. H. Conland, H. W. Buck, R. A. Johnson, W. R. McCain, and R. D. Olmstead. For the Connecticut State Highway Department, which supervised the work for the Bridge Commission, William J. Cox is commissioner, A. W. Bushell is deputy commissioner, L. G. Sumner is engineer of bridges and structures, W. G. Grove was formerly associate highway engineer, B. D. Freedman was formerly assistant engineer and G. L. Dunkelberger is architect.

Complete designs, contract plans, and specifications for the main river spans and the east approach viaduct were prepared in the office of Robinson & Steinman, of New York, consulting engineers, whose staff consisted of J. London, R. Boblow, R. M. Boynton, W. A. Conley, and the writer. The general features of layout and architectural design were prepared in the office of the Connecticut State Highway Department, which also prepared the complete plans and specifications for the west approach.

Many types of construction machines are made available to contractors from a Corps of Engineers equipment pool.

Army Equipment Pool Aids Contract Work

Contents in Brief—*An equipment pool maintained by the Corps of Engineers makes machines available to contractors for use on government work. Users pay a rental, lower than ceiling rate, which is deducted from estimates due. Repairs are handled at established equipment dealers' shops on an hourly basis. Not only does the pool assure widest use of available machines but it aids in maintaining contractor and equipment repair organizations.*

CONTRACTORS ENGAGED for government work in the South Atlantic Division of the Corps of Engineers are enabled to rent necessary construction machines from a central equipment pool operated by the division. The original stock of equipment held in the pool was secured by the government largely under recapture rental clauses, but these stocks are now supplemented by government purchase of essential machines through channels not open to civilian buyers. A definite rental schedule has been established for all the equipment, and the rent is deducted from payments due contractor. Machines can be used only on Corps of Engineers' work.

In making a bid on work the contractor states what equipment he has, or can get from private sources, and what he expects to ask the government to supply. The bidder is given a schedule of rates, substantially less than the ceiling rates established by the Office of Price Administration for equipment rental. Amount of the rental for government-owned machines must be included in the bid prices. Equipment that a bidder himself can supply is a factor in making an award that will be most advantageous to the government.

All kinds of construction machines are available because the South Atlantic Division has had one of the largest programs to provide housing, training facilities, and manufacturing plants for the Army. Most of the equipment used on this work is now held in the central pool.

Rental procedure provides that the contractor requiring machines request their procurement through the area or post engineer in immediate charge of the work. He in turn passes the request to the district office and from there it goes to the division equipment pool headquarters. This sounds like it might require a considerable amount of time but when there is an immediate need, and usually machines are wanted "yesterday," requests are handled by phone, confirmed by teletype, and quite often the machines are moving well ahead of official signatures.

Three men in the Division office control the allocation and movement of all machines. These equipment supervisors have final power to determine what machines go where, and when they must be transferred. They are in close contact with all branches of the Division office and thus are in position to know what projects should be given preference.

Machines are rented to the contractor for one-, two- or three-shift operation, as the work at hand may warrant. Heavy earth-moving equipment is usually rented only for around-the-clock operation. The contractor must pay charges for shipping to the work, much as when renting from equipment distributors and, if the machines are shipped out to a repair shop, he may be required to pay the shipping-out cost as well. Generally, however, machines move direct to other work that pays the transportation charges.

Light tools such as vibrators, small pumps, drills, circular saws and pneumatic machines are handled by the equipment pool on a buy-and-sell basis on appraised valuation. To avoid rental bookkeeping these tools are sold to the districts needing them on a basis of current value and are repurchased, when they are no longer needed, at their reduced value. The district offices, however, are obliged to rent them to contractor users on a monthly rate or some other mutually agreeable arrangement. The government can sell only surplus materials and tools are not in that class.

Government inspection measures

There are 20 experienced equipment inspectors in the field who keep constant check on the government-owned equipment. They watch lubrication, abuse and general operation, making recommendations for improvement where possible and assist in seeing that the right machines, and the proper number, are in use. The inspectors are familiar with job schedules and are in position to advise if more equipment should be acquired to meet necessary dates or if machines can be released to more urgent projects.

The government requires that all machines on rental be well maintained and properly lubricated. Use of full capacity of the machine is recommended, but no overloading or overspeeding is tolerated.

It is general practice for the contractor to maintain a crew for normal job repairs. Major repairs or rebuilding of machines is done by established repair shops throughout the area, under contract with the government. Generally these shops are those of equipment dealers, which were equipped and staffed before the war. Ordinarily, only machines of the types with which a shop is familiar are sent for repairs, but in emergencies a shop may be called upon to do any kind of work.

Repairs are handled by 32 different shops on a special contract under which the government pays for time and material. Parts and materials are purchased by the repair shop through usual commercial channels or are supplied by the government from warehouse stocks or on priority orders.

In addition to the contract shops the engineers have established a central repair shop where the largest equipment is rebuilt. Complete re-

Big machines and big tires are used hard but are well cared for to get greatest efficiency compatible with speed necessary for war construction.

Machines not needed on one job are made quickly available to other work by transfer through the equipment pool.

RENTAL RATES CHARGED CONTRACTORS FOR ONE SHIFT OPERATION.

Add 50 percent for more than 8 hours; 100 percent for more than 16 hours.

Machine	Excellent	Very Good	Good	Satisfactory
	Condition of Equipment			
Asphalt Distributor 1000 gal	$7.84	$6.72	$5.60	$4.48
Road Roller. Tandem 10–14 ton	8.98	7.70	6.42	5.13
Tamping Rollers. Double-drum	2.10	1.80	....	....
Engine—Gasoline 60 hp	1.87	1.60	1.33	1.07
Engine—Diesel 100 hp	5.72	4.90	4.08	3.27
Lighting Plants, Gasoline driven 5 kw	2.10	1.80	1.50	1.20
Crane or dragline—no bucket				
6 ton—½ cu. yd. gasoline	10.67	9.34	8.00	6.67
40–45 ton 2 cu. yd. gasoline	36.34	32.67	28.00	23.34
40–45 ton 2 cu. yd. diesel	45.34	39.67	34.00	28.34
Trucks: Dump 5 cu. yd. gas	13.16	11.28	9.41	7.52
Dump 9 cu. yd. diesel	35.00	30.00	25.01	20.00
Tractors: 45–49 hp. gasoline	7.35	6.30	5.25	4.20
91–94 hp. gasoline	11.67	10.00	8.33	6.67
70–87 hp. diesel	14.84	12.72	12.92	10.33
91–135 hp. diesel	18.08	15.50	10.60	8.48
Bulldozer: 45–62 hp. tractor	2.57	2.20	1.83	1.47
91–135 hp. tractor	3.38	2.90	2.42	1.93

building jobs are done in this well-equipped and adequately-staffed shop located at the division equipment pool headquarters. Here, worn parts are built up by welding or metallizing, and then are dressed to size for reuse.

Before the central control of equipment was instituted various projects had ordered large stocks of repair parts, many of which were not used. These were all transferred to a central supply depot from which all repair shops may draw as required. Some of the parts stocked did not appear to be immediately needed an were "circularized" to other Corps o Engineer divisions for disposal an use. Some seldom needed parts wer made available to manufacturers fo distribution to other accounts.

Record-keeping is handled in separate department. Records of th several thousand machines in use ar kept up-to-date on a visible card index. Nine copies of all transfer order are made, one each for the following Division equipment file; location file audit section; inspector; receivin area engineer and district engineer shipping area engineer and distric engineer; and one for the serial number file.

The card shows the movement o the machine and the time, plus description of the equipment and attachments and the mechanical condition. Also noted is the rate of rental to be charged for one-, two- or three-shift operation. The rental of the machine is billed by the division to the district, which deducts the amount from the funds due the contractor and reimburses the division.

Need and value of pool

Before the central equipment pool was inaugurated, equipment was held by the various districts. Consequently it was not available to other districts as long as there was prospect of future use of the machines. Under the present set-up nearly all available equipment is kept working most of the time somewhere in the division, actually 86 percent of full time. If a machine is not needed it can be declared surplus and quickly made available to other districts or even other divisions. This control of all machines has made it possible to assign equipment where it will open "bottlenecks" and thus bring up to schedule a particular part of the work.

The general scheme of making equipment available to contractors and having it repaired at commercial shops has maintained existing contractor and dealer organizations. Previous to establishment of this plan such firms were facing extinction because of government acquisition of much of their equipment, which could not be replaced.

Field organizations of the Corps of Engineers, and the contractors using the machines, enthusiastically endorse the plan as being very helpful in the present equipment shortage.

Locating Reservoir Leaks With the Aid of Air Bubbles

A novel method of locating leaks in the 6-in. concrete lining of one of the San Francisco's 10-m.g. reservoirs consisted of plugging the outlet of drainage pipes beneath the lining and pumping air in through the plug under light pressure. Bubbles in shallow water disclosed exact location of the leaks.

The drainage system consists of two halves, each extending around one-half the perimeter of the reservoir base below the joint between base and side slopes. To safeguard against rupture of the lining by excessive air pressure, a U-tube was tapped into the pipe delivering air pressure and the outer leg of the U, filled with water, was left open at a level 6 in. above that of the inner leg.

With this pressure in the drainage system and a water depth of 6 in. on the reservoir bottom, small bubbles appeared continuously above leaks through the paving, despite the fact that some of these were 100 ft. from the nearest point in the drain. Thus all leaks were easily and quickly located (there were several hundred of them) by workmen who marked all the spots where bubbles came through and then, after the water had been drawn off, placed the necessary concrete patches.

When the bottom was completely repaired, successive tests were made with reservoir water depth of 1 ft., 2 ft., 3 ft., etc., at each step locating the spots in the concrete on the side slopes through which air (and hence presumably also water) could pass. By reason of the low pressure used, no bubbles came through against the higher heads—bubbles appeared only in each successive zone while the side slopes were undergoing test.

Although this plan worked with notable success on this one reservoir, endeavor to use the same general system in locating small leaks in a larger reservoir was entirely unsuccessful, although the concrete lining of the second reservoir had the same thickness and holes were drilled at close intervals to get the compressed air beneath the lining. Whether this difference was due to a better concrete on the second reservoir is not known.

On both reservoirs the work was under the general direction of George W. Pracy, superintendent, San Francisco Water Department.

On a two-lane, divided bypass road in the Norfolk, Va., area, several large trees are being left in the dividing strip.

Roads Under War Restrictions—V

● Over a period of several months, editors of *Engineering News-Record* in their travels around the country have been discussing with state highway engineers the problems that war restrictions have brought to them. Conditions found in Virginia, West Virginia, Georgia, Kentucky and Indiana are reported herewith. Shortage of manpower and equipment is common to all, but the financial effect of war restrictions varies widely due to the different financial policies of the states. Earlier reports appeared in issues of Oct. 8, p. 484; Oct. 22, p. 555; Nov. 5, p. 627; and Dec. 17, p. 847.

VIRGINIA CUTS WORK FIFTY PERCENT

ORIGINAL CONSTRUCTION and maintenance program of the Virginia Department of Highways for the present fiscal year was $30,000,000, including work on access roads, but only about 50 percent of that work is to be carried out due to the war, according to C. S. Mullen, chief engineer of the department. New construction originally scheduled has been reduced as much as 90 percent in some areas and only about three-fourths of the new construction first planned will be built. Early in 1942 numerous projects were given only an A-1-E priority rating, but in recent months many of these jobs have been given AA-2-X ratings. This latter classification has permitted work on many projects that were severely restricted before, and but for this change the amount of new construction would have been reduced still more.

Maintenance, resurfacing and replacement of old bridges, which accounts for about $11,000,000 yearly in Virginia, also has been severely curtailed. Total mileage maintained by the Virginia department is 9,500 miles of primary highways and 37,000 miles of secondary road. A large part of the primary mileage is various types of bituminous construction, including a large mileage of bituminous surfacing over an old concrete pavement. Untreated soil and gravel roads also account for about 18,000 miles of highway; much of this mileage is county roads not eligible for federal aid. The very low priority on bituminous material, which made procurement of this product difficult, has been aided by lifting restriction on certain tars.

No relief in obtaining bituminous products is seen in the near future and in some cases the Virginia department may not attempt to maintain the bituminous surfacing. Instead, the road will be permitted to revert to the original sand and gravel base or whatever type was employed. Also, extensive patching on several highways is planned, rather than attempting to get all the necessary materials for rebuilding these roads.

On a par with the difficulty of obtaining materials is that of getting new equipment, and almost as difficult as this problem has been that of securing spare parts for equipment now in use. In the same way, renting equipment has become very difficult and much more expensive than in the past. For example, in the Hampton Roads area, 1½-ton trucks could be rented for $1.25 per hour before start of the tremendous war construction program in that region but now the rate is $2.00.

Not only has the difficulty of getting materials for both new construction and maintenance caused a big reduction in the amount of work planned, but the manpower shortage, especially at Hampton Roads, is severe. Skilled labor is more plentiful than common labor, but both are very difficult to obtain. In all, about 3,000 men of a total of 7,000 state highway employes in Virginia have been lost to the war program, including a very large number to the armed forces. Also, many military organizations have requisitioned both equipment and personnel in several areas. In one case, two survey parties of about 16 men in all, complete with trucks, surveying equipment and other tools, were requisitioned for work in the Newport News area.

To overcome the shortage of manpower, women are being used as draftsmen, but up to Dec. 1 only about a dozen women workers had been so employed. A plan is being considered whereby women workers also would be employed in the testing laboratories and on many similar jobs. This arrangement, although expected to help, will not prevent the manpower problem from becoming more severe as time goes on.

Another severe problem that is anticipated is snow removal and winter maintenance on the highways in the northern part of the state during winter months. Not only is insufficient snow removal equipment available, but the shortage of repair parts is expected to greatly increase this trouble. In addition, the large manpower loss has included many truck and grader operators normally employed to operate snow removal equipment.

Critical materials saved

To reduce the use of critical materials on new construction projects, much non-reinforced concrete pavement is built. A 9-in. slab with expansion joints on 100 to 125 ft. centers and contraction joints on a 20-ft. spacing are used. No steel is required, as not even dowels are employed.

Many new bridges that were originally planned are not being built, but where some type of crossing must be constructed, concrete structures are specified. For shorter spans and where box culverts might have been preferred in the past, non-reinforced-concrete arch structures are used; on longer spans, beam and slab designs are employed. A stone arch of 16-ft. span built by regular employes of the department is considered so satisfactory that this type of structure may be built at a number of sites in the near future.

In Virginia it has been almost as difficult to get treated timber as to obtain steel. However, a few bridges with timber pile substructures and reinforced-concrete decks have been constructed. Also three large all-timber structures will be built with federal funds on access roads in the Hampton Roads area. One of these is to be a $76,000 overpass on 58th Street in Newport News; this will have a laminated timber deck. In addition, two timber overpasses on roads leading to naval bases in the Norfolk area are planned.

Traffic densities on Virginia highways are much lower than for the same period last year and at the end of November the total traffic was 40 percent below that of last year. Greatest reduction is in light trucks and passenger cars; passenger car traffic has been reduced 68 percent over a year ago. However, heavy truck and bus traffic has increased, including roughly a 50-percent increase in the latter. Also heavy trucking is 3 or percent more than at this time last year.

In contrast to the reduction of total state-wide traffic, traffic in some areas has increased greatly, especially in the Hampton Roads territory and in Arlington County, which is across the Potomac River from the District of Columbia. In certain sections this increase has been so great that shoulders have suffered severely, although the destruction of the pavement has not been so great.

Picture not all black

Income to the state highway department through the registration of motor vehicles as of Oct. 20, 1942 was 16 percent lower than last year. However, because of the increase in bus and heavy truck traffic, the reduction of income from the gas tax and registration fees is not as yet serious and does not equal the reduction of traffic densities.

INDIANA BUILDS ACCESS ROADS

Major program of the Indiana State Highway Department is the construction of access roads to war plants, which has taken precedence over all other work. Other than this there is very little new road construction now in progress in Indiana and new construction in 1942 was less than 50 percent of that of last year.

Proof that Indiana is building little other than access roads is shown by a breakdown of all new construction jobs in progress in that state. A summation of the contracts in force at the end of 1942 shows that about $7,000,000 of the work is access roads where the federal government is supplying 100 percent of the cost; that $4,105,000 of the projects are on the strategic network where the state meets 25 percent of the cost and the federal government 75 percent; and that $198,000 of the contracts are for jobs on the federal-aid system, whereby the two governments divide the cost. The normal annual road construction program in Indiana with state funds is $10,000,000.

Many months ago the Indiana department and the other state agencies held a series of meetings and made extensive studies as to how work could be reduced to release personnel, equipment and materials for war work. Thus, when the War Production Board recently stopped highway construction of no immediate value to the war effort, only two road projects and two bridge jobs, one a $55,000 structure and the other a $56,000 contract, had to be shut down in Indiana.

As a whole, the Indiana state highway system, which totals 10,100 miles, is in excellent condition and only a few primary roads need improvement. When a survey was made in 1940 in cooperation with the Public Roads Administration as to desired improvements of the nation's strategic network, improvement of but one road and four bridges was recommended for the entire Indiana system.

Only twelve bridges are now under way in the entire state and these are all small projects. Two of the structures are of a design requiring a timber substructure and a combination laminated wood and concrete deck. The other structures under construction are designed for non-reinforced abutments and a reinforced concrete deck. No future timber bridges are planned. This is for two major reasons. First, timber and wood piles have been difficult to obtain in Indiana, and, second, experience in the past has shown bridges of this type to have short life, and to be rather unsatisfactory from the standpoint of service and maintenance. In the same way, no masonry arch bridges have been built because they are considered too costly from the standpoint of labor.

Repair parts a problem

Despite the reduced construction program, the department has several major problems, and to get repair parts for construction equipment is one of the most severe. Repair parts are almost as difficult to obtain as new equipment. However, highway officials are not too concerned about this difficulty at the present time, as past experience shows that maintenance crews are very ingenious when it comes to salvaging old equipment and repairing wornout parts.

The supply of manpower, both skilled and common labor, is another problem, as much of the normal supply has been claimed by the numerous war construction projects in Indiana. During the past summer, high school boys and some college men were employed, but since the schools started, labor has become much more serious. In connection with manpower problem, it is interesting to note that highway officials in Indiana are taking the attitude that an employee does not lose his seniority rights when he leaves to join a war agency. Instead, if a man takes a war job for the duration of war, he can later rejoin the department without losing the benefits of his service before leaving for a war assignment. This, of course, holds only where the employees are leaving to join the armed forces or to join some organization directly connected with the war effort.

To date, dislocation of traffic has been noticeable, but not as severe as was expected. The biggest reduction is on Saturdays and Sundays, which shows that it is pleasure driving that has been reduced. The total reduction during the fall months was about 25 percent below last year.

Income from the gas tax in Indiana has been reduced as a result of the decreased traffic. However, the reduction in income is not as great as was expected and will cause no hardship in meeting obligations for work under contract, since Indiana issues no road bonds but carries out its work on a pay-as-you-go basis.

Up to the end of 1942 there had been very little decrease in auto license registration. That for 1942 was less 5 percent below normal, but due to the tire shortage and restrictions on the use of gasoline a larger reduction can be expected during 1943.

Plans for future maintenance in Indiana is to place major emphasis upon those roads of maximum value to the war program, and to maintain less important roads only sufficiently to protect the investment. Operations such as weed cutting has been reduced, as well as other maintenance.

No out-of-the-ordinary problem is seen in snow removal during the winter. Sufficient repair parts have been obtained to recondition snow removal machinery used during past years, and this is considered sufficient to continue that work.

In summary, as a whole the outlook for the Indiana State Highway Department, as reported by R. H. Bower, chief engineer of the construction division, and N. F. Schafer, superintendent of the maintenance department, is not discouraging; nor is it believed that the state's highway network will suffer severely during the next few years, even if maintenance is not as extensive on some routes as at present.

GEORGIA SHORT ON MANPOWER

Right in the center of a large concentration of army and navy camps and other war construction, the Georgia highway department has found keeping men the most serious difficulty of war time operation. With the old organization broken up just at the start of the high-wage era by cuts in pay, the personnel problem has been very serious. The U. S. Engineers, architect-engineer-manager firms and contractors have been offering pay far in excess of that customary in Georgia and consequently have taken many of the engineers and trained maintenance men. The state budget set-up does not permit appreciable increases in the salary rates. However, a temporary expedient has been found in paying living expenses of men sent to war congested areas on construction assignments.

No new road equipment is procurable and none has been purchased for two years previous to our entry into the war so the machines on hand are relatively old. The Navy recently asked for some of the few remaining machines that are in good condition. With the help of the Public Roads Administration in Washington, the highway department was able to hold the machines for essential road work.

Competent repair men can not be secured in sufficient numbers to keep the equipment moving and men of all classes are being refused deferment from the draft. M. L. Shadburn, chief engineer of the highway department, feels the federal government should recognize the necessity for roads, especially for other than immediate access to camps and make provision for them.

Principal road work at present is about $2,500,000 of construction including 20 miles of 4-lane concrete construction near Ft. Benning; seven contracts in and around Macon, mostly for rebuilding and widening, that will cost $2,000,000; and a new two-lane road to a plant near Marietta giving a total of 8 lanes from Atlanta for an expected large number of commuting employees. The latter road has a $201,000 all-concrete deck-girder bridge that has continuous 65-90-65-ft. spans over the main channel and twelve 40-ft. approach spans at the Chattahoochee River crossing. The roadway is 26 ft with a 5-ft. sidewalk.

One large bridge is approaching completion and another has just been placed under contract for replacement of wood deck bottleneck structures on the coastal highway near Darien. The first structure has two sets of 91-150-91-ft. continuous plate girder spans, two 85 ft. simple girder spans and thirty-six 40-ft. long reinforced concrete deck girders for a total length of 2,382 ft. Its roadway provides 40-ft. between curbs. (*ENR*

Dec. 10, p. 821). Approach fills are to be made by hydraulic methods but have been delayed by inability to get a dredge. The bridge recently put under contract has one continuous 91-150-91-ft. semi-deck girder section a simple 80 ft. span and twenty-six 40-ft. concrete deck spans. Two 22-ft. separated roadways and two 4-ft. sidewalks are provided.

DEBTS TROUBLE WEST VIRGINIA

In addition to the problem of obtaining materials, equipment, supplies and men for new construction and maintenance, the West Virginia State Road Commission has the added burden of meeting large bond retirement and interest on obligations from a largely decreased income, according to M. L. O'Neale, chief engineer. Reduction of some 25 percent in both primary and secondary road funds due to loss of gasoline taxes alone, as compared to the same period last year, has seriously affected the financial situation.

This large decrease in gasoline taxes started about the first of July 1942. Revenues from all sources, of which the gas tax is a big share, are now collected at a rate of about 30 percent less than for the same period last year. Losses in traffic is reflected by the reports from eleven fixed-type electric-eye recorders at strategic points throughout the state. The decline in 1942 as compared month by month with 1941 traffic is of interest. In January, 1942, there was a 2 percent gain, but the decline in succeeding months in percent was as follows: February, 4.3; March, 9; April, 16.8; May, 18.8; June, 25.8; July, 31.3; August, 35.6; September, 32.9; October, 36.3; and November, 39.

Gasoline tax collections for August, 1942, in West Virginia totaled but $666,063, or more than $380,000 below the $1,040,643 total for the same month a year ago. Those for September were $374,000 less.

In addition to the above, there has been a severe drop in motor vehicle registration, which normally accounts for about one-third of the income of the road commission. The severity of this decrease is revealed by the fact that on June 30, 1942, a total of 274,000 passenger cars were registered. With the start of the current registration year, July 1, many motorists failed to renew their registration. As of Dec. 1, 1942, there were only 215,000 vehicles registered.

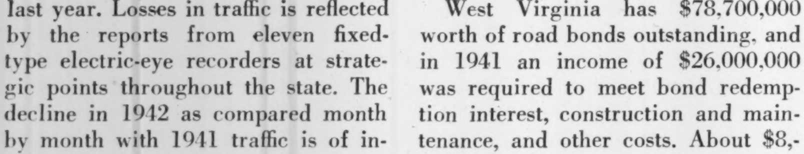
West Virginia has $78,700,000 worth of road bonds outstanding, and in 1941 an income of $26,000,000 was required to meet bond redemption interest, construction and maintenance, and other costs. About $8,000,000 of this must be spent annually for bond retirement and interest, which represents about 27 percent of income. About 37.4 cents of every highway dollar goes for new construction and 28.9c. for maintenance. Approximately [illegible].9c. goes
certain other costs such as plant
equipment, administration and v
ous miscellaneous expenses.

As previously mentioned, anot
problem of the West Virginia co
mission has been that of manpow
There have been large person
losses among technical and constr
tion men, such as designers, insp
tors and instrumentmen. In fact,
July 1, 1942, there were 256 salari
employees in the construction di
sion of the commission, and on Se
26, 1942, this group had dropped
162 employees. In the maintenan
division there has also been a co
siderable loss of key salaried me
and also of skilled mechanics a
equipment operators. Many men ha
left for higher paying jobs. Howev
the armed forces also have taken
large toll.

Although much new constructi
originally planned was stopped, th
has been largely offset by projec
such as access roads made necessar
by the war. Therefore, for the cale
dar year 1942 the construction pr
gram on a dollar basis was about
a par with that of 1941. New co
struction projects financed partly
wholly with federal funds in 19
total about $6,000,000.

Because of the difficulty in gettin
reinforcing steel, it has been nece
sary to eliminate it as far as possib
on all new concrete construction. Co
crete pavements this year have there
fore been non-reinforced 8-in. slab
Likewise, reinforcement has been r
duced to a minimum on concret
bridges and in some cases non-rei
forced abutments have been use
The use of critical material in ever
category has been reduced to a mini
mum. This has necessitated the re
placement, as required, of many sma
secondary road bridges with timbe
structures, rather than with somethin
more permanent.

The State Road Commission o
West Virginia has jurisdiction ove
both primary and secondary high
ways, a total of 4,738 miles of pri
mary roads and 28,136 miles of sec
ondary roads, which makes the prob
lem of securing maintenance materia
extremely serious. In the past, th
state has divided its bituminous re
quirements between asphalt and ta
However, it became almost impossib
this year to secure asphalt. Much ta
is produced from by-product cok



When West Virginia rebuilt Route U.S. 60 between Charleston and Huntington, a much better alignment was provided, as shown by above view of the new and old pavements. Two 11-ft. lanes are now available, but the design provides for a future 4-lane divided highway.

crete bridge built by West Virginia an access road to an ordnance plant in
on County has "spill-through" abutments.

ns in West Virginia, the produc-
of which has been greatly in-
ased under the stimulus of war.
rtage of storage facilities actually
lted in a surplus of tar in certain
ances. Therefore, it was possible
ecure sufficient tar for the bitumi-
s requirements, although there
s considerable delay in securing
al approval, with the result that
e of the contemplated resurfacing
ld not be completed in 1942. The
tlook for bituminous materials in
43 is not yet clear.

West Virginia, in common with other states, faces a most difficult problem in obtaining new equipment and repair parts for existing equipment. The various restrictions imposed by the federal government, together with curtailment of revenues will probably result in a very minimum of construction work in 1943. It is hoped, however, that the roads can be effectively maintained with the available men and equipment to provide reasonable transportation facilities throughout the state.

KENTUCKY HAS MAINTENANCE LABOR

Although manpower for new high-
y construction in Kentucky has
en reduced extensively by the war
ort from both the contractors'
ndpoint and that of the Depart-
nt of Highways of Kentucky, the
partment is still fortunate in being
le to retain the major portion of
e old-time maintenance crews, ac-
rding to G. L. Logan, director of
nstruction for the department. In
rtain regions, of course, where war
ork has been extensive, such as in
e Louisville and the Cincinnati
eas, many of the skilled mainte-
nce men have left the department
obtain positions in war industries.
owever, from the present outlook
ere appears to be no doubt but that
e maintenance crews now on hand
ill be able to carry on nearly as
ell as in the past, provided mate-
ials and repair parts are made avail-
ble.

Obtaining replacement parts for
quipment is one of the most severe problems, and it has resulted in the department using its many field shops to make repair parts. Such parts have been used in many instances in the past and have lengthened the life of a great deal of equipment. In regard to winter maintenance and snow removal equipment, major difficulties are not anticipated this winter, since the machinery now on hand for this work is in good condition and has proven sufficient in the past.

The Kentucky department has over 9,500 miles of road to maintain. This total includes more than 4,000 miles of bituminous construction, 2,260 miles of traffic bound macadam, 1,300 miles of portland cement pavement, 970 miles of gravel and 770 miles of rock asphalt. Repair of these varied types of construction requires many different kinds of materials, but there is the advantage that many opportunities are offered for substitution. As a result, Kentucky should be able to obtain sufficient materials for the next few months.

Despite the rather optimistic picture as to maintenance work, the present outlook for new construction is somewhat black. The principal reason for this, of course, is the materials and equipment freeze order placed in effect by the War Production Board to virtually limit highway construction to projects actually essential to the war effort.

The loss of skilled engineering personnel also has kept pace with the sharp reduction in construction work and the department's records show that up to Jan. 1, 1943, personnel losses in various branches were roughly as follows: 50 percent of the men having the ratings of levelmen, instrument men and technical inspectors, 30 percent of the resident engineers and 60 percent of the men in the bridge design and road drafting offices. Therefore, the department with its present engineering personnel would be unable to handle construction programs as large as those in the last two construction seasons.

The department during the latter part of the 1942 construction season had difficulty in getting a sufficient number of bidders on highway construction projects. This condition was due to the fact that many contractors had war contracts, and those available to bid did not appear interested in highway work that did not carry an especially high priority rating. Another reason given by the contractors for not being interested in road contracts was their inability to obtain sufficient skilled men to carry on construction operations. Contractors have likewise complained in regard to the shortage of common labor for road construction. In addition, surfacing contractors made known that it was almost impossible to obtain trucks by any method of negotiation and to interest a hauling contractor in connection with new work appeared to be a thing of the past. The fact that several county seats in Kentucky are located 40 miles from any railroad, and some smaller isolated towns much farther, makes the problem more difficult.

The combination of all the conditions enumerated has assisted in making Kentucky highway projects decidedly unattractive to the contractors. Therefore, the engineering

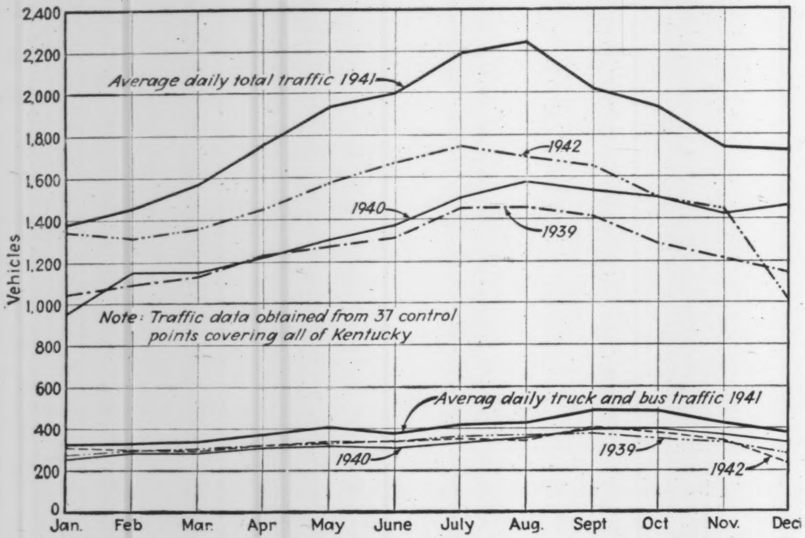


Fig. 1. Traffic on Kentucky highways in 1942 was greatly reduced over 1941, but for the most part greater than for the three previous years. The chart above was prepared by the traffic department of the Kentucky Highway Planning survey.

and supervision shortage, together with an apparent lack of prospective bidders for highway work, would make it most difficult for the department to carry on a large construction program in 1943, even if priorities on materials were issued freely.

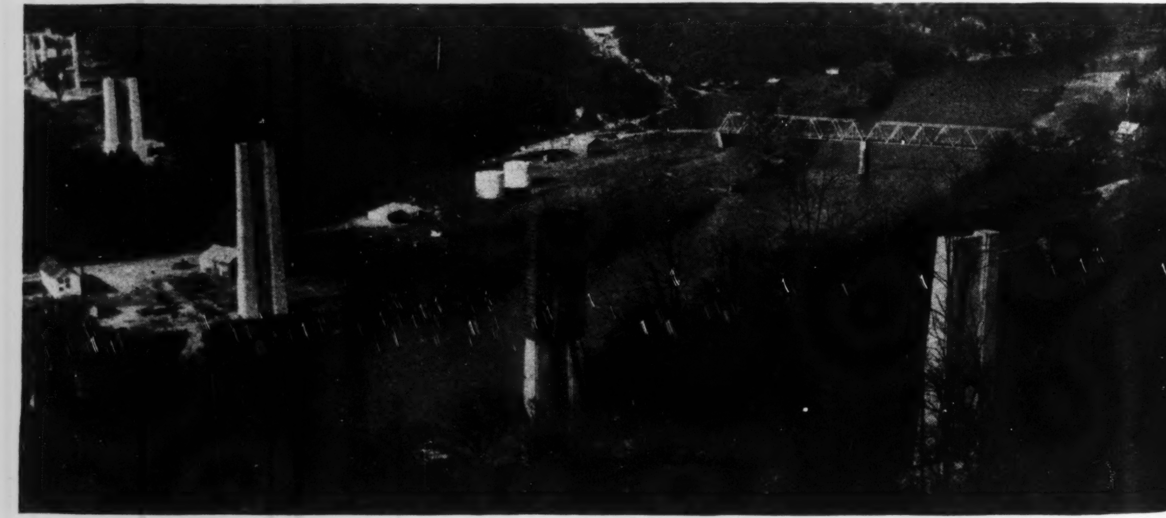
The Kentucky department completed 90 percent of its 1942 program before the winter season of 1942 started. Virtually all of the concrete paving constructed last year was placed without the use of mesh reinforcement, tie bars, and load transfer devices. Many culvert structures, principally the arch type, were constructed without the use of reinforcing steel. Timber bridges have not been built in large numbers and only on secondary roads. This type of construction is considered unsatisfactory from a maintenance standpoint. Also, restrictions on timber and supplies prohibit the construction of many types of timber structures.

In the fiscal year that ended April 1, 1942, Kentucky spent for new work $11,625,000 of which $4,276,000 was federal-aid funds. Maintenance during the same period on the state-road system cost $5,374,000. addition, $1,832,000 was spent maintenance and construction rural highways, which are not a p of the state-maintained system. E mates for expenditures for the fis year to end April 1, 1943, are not yet available, but indications are th expenditures for this period will be nearly as great as for the previ twelve months.

Income from motor vehicle reg tration and license permits w slightly reduced in 1942. During t calendar year of 1942 these c lections amounted to $3,231,494, compared to $3,233,165 in 1941.

As expected, the reduction in tr fic, including truck and bus traf during 1942 was considerable. Th reduction is shown graphically by accompanying chart. As a result the reduced traffic there also was large reduction in the income fro gas taxes. For the calendar year 1942 the gas tax revenue collectio were $14,146,371, which compar with $16,663,545 for the 1941 c endar year.

In conclusion, it should be sa that as the spring of 1943 approach maintenance work is expected to r tain most of its high standards f at least the first few months, sin sufficient materials are on hand t commence some of the heaviest mai tenance operations when weather co ditions permit. However, new co struction work, traffic and revenu are expected to continue to decline.



Most notable bridge project underway in Kentucky is on U. S. Route 25 over the Kentucky River at Clays Ferry. It is replace the old iron bridge in background built in 1869, and requires piers 198 ft high to support a 26-ft. clear roadw 250 ft. above normal pool level. The central portion is to be a 3-span continuous deck truss with a 448-ft. middle sp

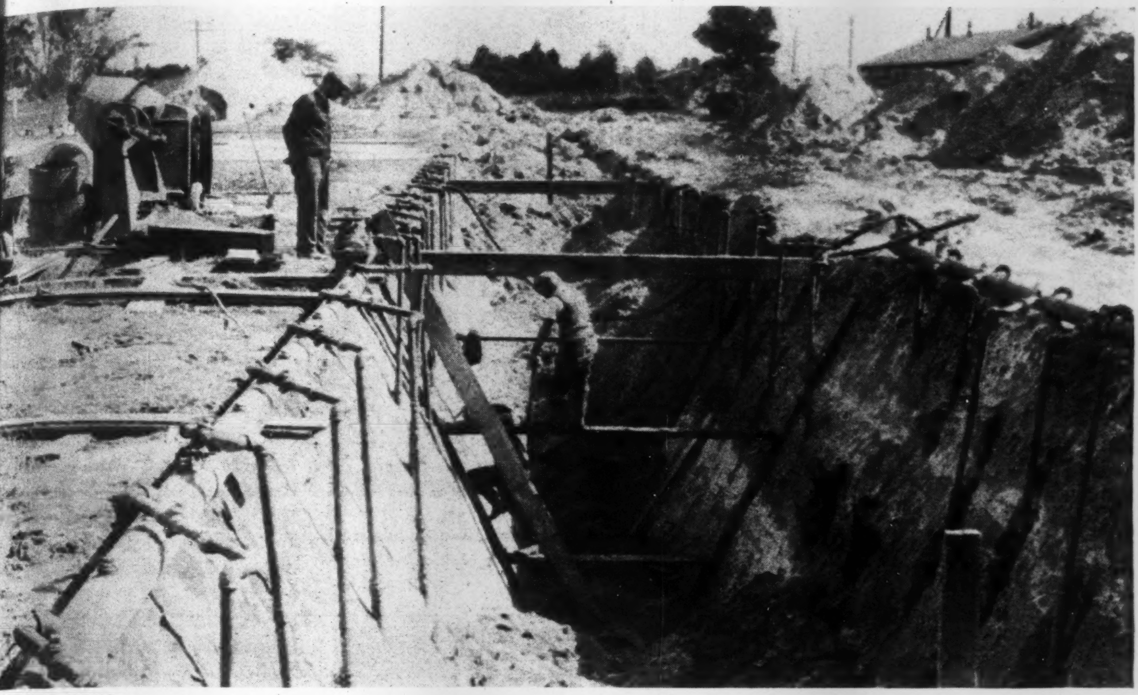


Fig. 1. Wellpoints eliminated the need for sheeting in constructing this 27-in. dia. Sewer in a 14-ft. deep trench.

Wellpoints Eliminate Sheeting for Sewer

ontents in Brief—Wellpoints expedited construction of a 27-in. dia. reinrced-concrete sewer in a 14 ft. deep trench in sandy soil where the ater table is only 3½ ft. below the surface. Two lines of points, one on ther side of the trench, permitted the use of 2 on 1 side slopes. An 18-man ew installed 40 ft. of sewer per 10-hr. day at a cost of $10.50 per lin. ft.

AVOID THE USE of sheeting in conructing a deep sewer in bad soil here the water table is but 3½ ft. low the surface, the general conactor on a Portsmouth, Va., project employing wellpoints to great adntage, installation cost is less than sheeting were employed and, in adtion, safe and rapid progress is posble. The project involves construcon of 2,000 ft. of 27-in. dia. reinrced-concrete gravity sewer at a epth of 14 ft. in a very sandy soil at has the qualities of quicksand hen disturbed.

The sewer is an important part of n outlet sewer serving a population f 18,000 that is to occupy a 5,200-nit war housing development just utside Portsmouth (See *ENR*, Aug. 3, 1942, p. 212 for housing details).

The general construction procedure is to use on each side of the ditch, which has a top width of about 13 ft., a line of wellpoints on 5-ft. centers and to connect the two lines by 6-in. headers. Each wellpoint consists of a 3-ft. long screen at the end of 16 ft. of 2-in. dia. pipe. This length of pipe was chosen to permit the wellpoints to project 3 to 5 ft. below the invert of the sewer.

A total of 80 points are employed. Generally 50 to 60 points are used to draw down the water while the others are removed and installed ahead. The 50 points used for the dewatering operation are interconnected so that they can be served by a single 6-in. centrifugal pump. The latter discharges into an open ditch paralleling the sewer some 50 ft. away. Total discharge from 50 points is about 20,000 gal. per hr.

The wellpoints are jetted into the ground by use of a 6-in. centrifugal pump creating a pressure of 150 psi. A 4-man crew, installing the points one at a time, is able to put down about 15 points an hour. Water for the jetting operation is obtained by a suction line extending to the open ditch previously mentioned, or from the wellpoint system itself.

Pump operates continuously

The discharge pump connected to the wellpoints operates 24 hours per day and if for any reason it has to be shut down, water begins to appear within a few minutes at the bottom of the trench. In a short time the incoming water causes the sides of the trench to slide in and within about 3 hours the entire trench probably would be full of water, as in that period the inflow would rise to the level of the water table. Thus, when the pump normally connected to the well points has to be moved forward,

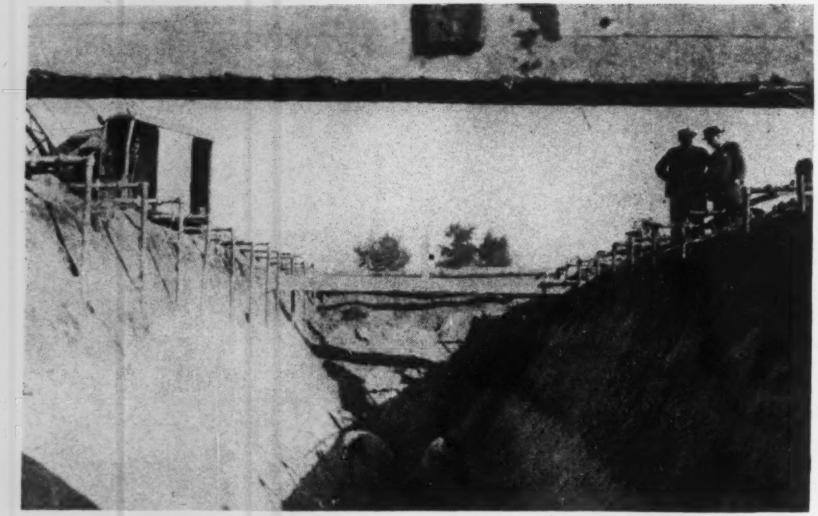


Fig. 2. Use of the wellpoints permitted 2 on 1 side slopes, which are trimmed by hand. The soil is a fine sand that becomes very unstable when wet. Stratification of the soil may be noted.

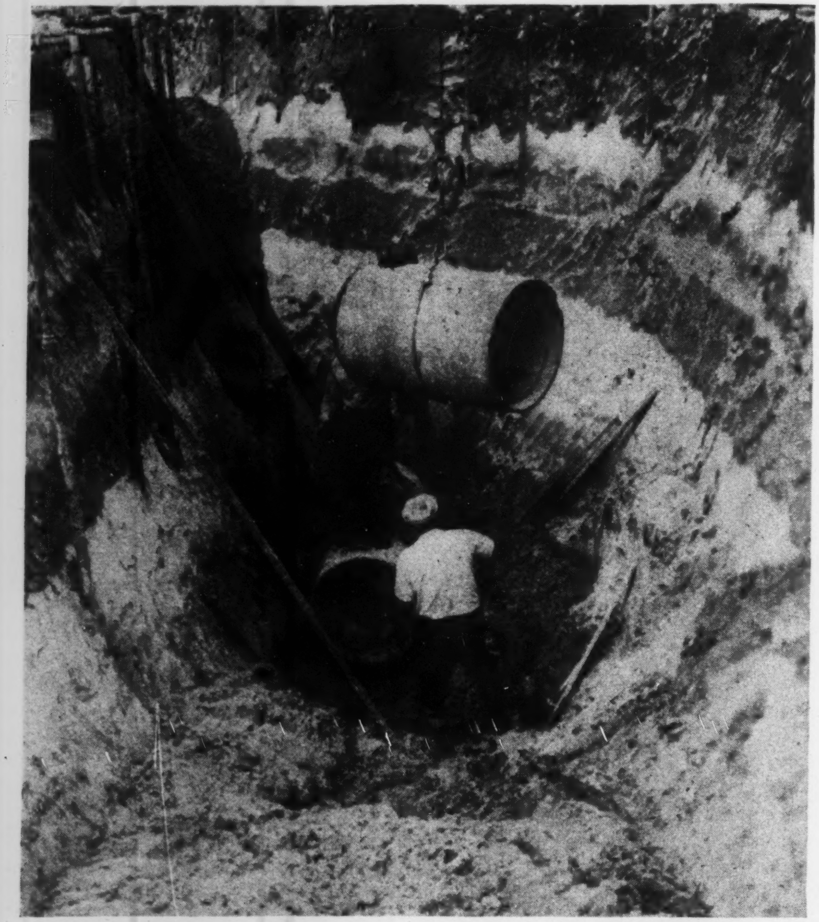


Fig. 3. Sections of pipe are lowered into ditch by crane that does backfilling. A continuous cradle is built under pipe to give it strength to carry the load of the deep backfill. Concrete for this cradle is mixed on the job and placed by the chute shown at the left.

the pump used in jetting the into place is connected to the points and used for dewatering the regular unit is back in servi

Trench excavation is by a clamshell bucket handled by a cra crane, which excavates to a poin to 20 ft. from the front end of header. This crane operates abo ft. in advance of the point where is being laid. The total length header used on each side is about ft. As the excavation advances 2x in. timbers (roughly 10 ft. long on 20-ft. centers) are placed tr verse to the ditch on either side support the header line. The in end of these timbers extends ab 1 ft. into what would be the fu trench. The header pipe on that is placed on this plank after the o end has been fastened down by d ing two 2x6-in. wood stakes and n ing a cross piece between them above the 2x10-in. timber. This rangement prevents the header pi from sliding into the trench as ex vation progresses.

Steep side slopes possible

A second $\frac{1}{2}$-yd. crane aids in rem ing the dirt loosened by the two m trimming the side slopes by ha Because of the effectiveness in dra ing down the water, side slopes 2 on 1 are possible. This second cra also lowers into place the 4-ft. leng of pipe, which are delivered by tru

Wall thickness of the concrete p is $3\frac{1}{2}$ in. and each section wei about 1,500 lb. The pipe has s joints, and it is reinforced with single layer of 4x6-in. mesh of No. wire. It has a cracking strength 2,550 lb. per lin. ft. and a crushi strength of 3,800 lb. per lin. ft. Sin a total load of 4,300 lb. per lin. ft. expected, due to the depth of t cover and live loads, a continuo concrete cradle is required. This co struction increases the crushi strength of the pipe to about 7,0 lb. per lin. ft.

To permit construction of a cra with a minimum thickness of 5 i under each section of pipe a sh 2x8-in. block is placed transvers with a 4x6-in. block on top of t The concrete, which is a $1:2\frac{1}{2}:5$ m is mixed in a $\frac{1}{2}$-yd. portable m and is placed with wheelbarrows a a chute. Since the cradle is carr up to three quarters the diameter the pipe, 3.6 cu.ft. of concrete

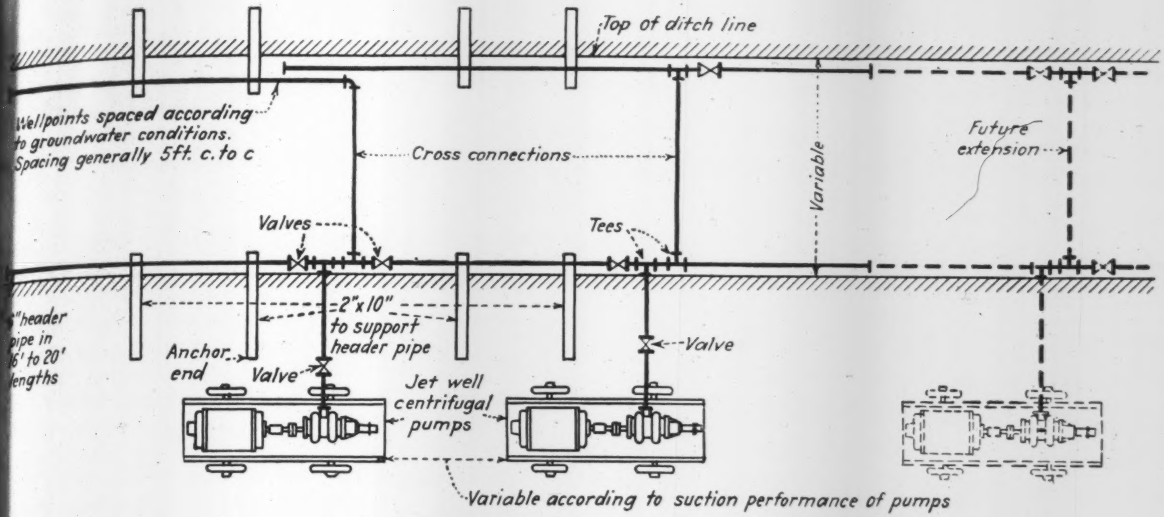

Top of ditch line
Wellpoints spaced according to groundwater conditions. Spacing generally 5ft. c. to c
Cross connections
Future extension
Variable
Valves
Tees
6" header pipe in 16' to 20' lengths
2"x10" to support header pipe
Anchor end
Valve
Valve
Jet well centrifugal pumps
Variable according to suction performance of pumps

Fig. 4. Plan of pipe layout for use of about 80 wellpoints. Two lines of wellpoints, one on either side of the trench, are employed and the wellpoints are spaced according to groundwater conditions or generally on 5-ft. centers. The layout illustrated permits use of one pump for unwatering purposes and one unit for jetting new wellpoints into place.

needed for each foot of sewer pipe.

The second crane, in addition to removing the "clean up" excavation and lowering the pipe sections into place, also does the backfilling. No compaction of this fill is required because of its sandy nature. In addition the second crane pulls up the wellpoints that are no longer needed and transports them forward; the points are pulled up one at a time after the header pipes have been disconnected.

In a 10-hr. day and despite rainy weather an 18-man crew is able to construct an average of 40 ft. of sewer per day, including all operations except manufacturing the pipe. In good weather 50 ft. per day is not uncommon, and as much as 60 ft. has been placed in a day. The 18-man crew consists of the following workers: 2 crane operators and oilers; 1 pump man; 4 men who jet the wellpoint pipes into place; 2 men trimming the sides of the trench; 4 men on the mixing operations; 2 men laying the pipe, and one foreman in general charge.

Sewer costs $10.50 per ft.

Total cost per foot of pipe, including the excavation of the trench, laying the pipe and backfilling, is $8.50. Supplying and placing the concrete for the cradle is by the same contractor at a cost of $2.00 per ft., making the total cost of the sewer, exclusive of manholes, $10.50 per lin. ft.

In the 2,000 ft. of sewer only four manholes are required and these are of brick construction and 4-ft. diameter. They are used where there is a change in alignment and not over 600 ft. apart. Each manhole costs $175.

The work is being carried out by general contract by the Norfolk regional office of the Federal Works Agency with Blair Boyle, regional engineer. The N.A.K. Bugbee & Co., Inc., Trenton, N. J., is the contractor for whom Herbert W. Bradley is in general charge and William Driver, superintendent. Greeley and Hansen, Chicago, with H. B. Wildschut, resident engineer, is architect-engineer for the work. Moretrench Corporation, Rockaway, N. J., aided in the solution of the dewatering problem.

Fig. 5. When wellpoints are moved forward, they are jetted in place one at a time by 4-man crew using centrifugal pump that develops 150-psi. pressure.

Inland Waterway For South America

Charles Jay Seibert
Civil Engineer, Washington, D. C.

Contents in Brief*—With the background of thirty years experience in port developments and other engineering work in South America, the author outlines a plan for an inland waterway that would traverse the very heart of this continent. Such a waterway would be invaluable in opening vast new territories for development, and thus help to implement postwar relations with our neighbors to the south.*

THE PROPOSED SANITATION and health program for Amazonas, Brazil, reported in *Engineering News-Record*, impels the writer to call attention to a short paragraph that appeared recently in the *Washington Post* in the column written by Drew Pearson. This item stated that the presidents of Brazil and Venezuela had pointed to the practicability of developing an inland waterway from the Orinoco to the Amazon via the Cassiquiare and Rio Negro rivers; it was further stated that the president of Venezuela had already had a reconnaisance made, which showed that few difficulties existed in the way of opening up such a waterway.

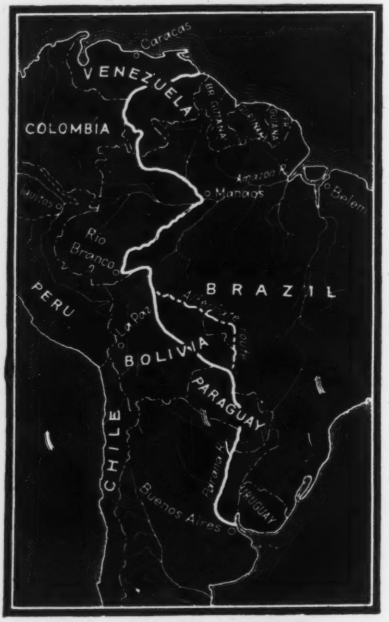
This substantiates what the writer has known for many years, that a route, navigable at certain seasons of each year, already exists from the Orinoco to the Rio Negro, a route which may be safely negotiated by steam launches of at least six feet draft.

Early observations

In the early '90's, while connected with the port developments at Manaos, the writer observed that each year, at a certain season, flotillas of huge canoes, manned by Indians, arrived at the port to trade pissava and fibres for manufactured goods; it was reported that these Indians came from the Vichada and Guaviare rivers in Colombia.

Curiosity led the writer to accompany an Armenian trader, who had connections at Sao Gabriel and Sao Felipe, on a voyage to the upper Rio Negro and to induce him to make the passage into the Orinoco. This was done without untoward incident, and the descent of the Orinoco was made to the town of San Fernando. In deference to the wishes of the owner of the 25-ft. steam launch, whose interest was dictated by commercial reasons, further exploration was abandoned and we returned to Manaos.

Since that time, some thirty years' residence in various parts of Brazil afforded opportunities to make voyages on tributaries of the Amazon and to interview pilots and *seringueiros* and to study maps and to discuss the waterways of Amazonas with men who had accompanied General R don on his surveys from the Boli to the Guiana frontiers. These in tigations have convinced the wr that it is feasible, not only to open an inland waterway from the Orin to the Amazon but to do so from Amazon to the Paraguay River a thence to Buenos Aires; a comp waterway extending for 5,300 mi through the heart of South Ameri



Suggested route of the inland waterway through the heart of South America.

Route selection easy

This route, starting at the mo of the Orinoco would go via the C siquiare to the Rio Negro, to Amazon, to the Purus and the Acre. From that river a way wo have to be found into the Mamo above the rapids. The distance is on about 150 miles and many large ri ers such as the Orton, the Madre Dios and the Beni cut across this te ritory and flow into the Madei Mamore rapids.

From the confluence of the Mamo and the Guapore investigations wou have to be made to ascertain whi of the many rivers would provide th best route to the Paraguay. The Gu pore has its source in lowlands i which the Paraguay also has its head waters, but it is possible that a rout up the Magdelena, in Bolivia, woul lead to flat lands through which cana ization into rivers leading directly t Puerto Suarez, on the Paraguay, o posite to Corumba, would be advis able.

Twenty-five years ago the conten plation of such a project would hav been almost out of the question: to day aerial reconnaissance makes th selection of a route a comparativel simple matter.

The objectives of such a waterwa would be, not to shorten the prese sea route from Atlantic ports, in thi country to the coastal cities of Argen tina and Brazil, but to open up an bring people into the real heart o the South American continent.

Manaos, a deep water port, is 1,000 miles from the sea. It is situated at 30°S. 60°W. and accessible only from Belem which is at 1° 30′ S. 48° W. necessitating a three and one half days voyage, by *ocean steamer* up the river. To visualize the matter better, suppose that the Mississippi at Davenport, Iowa, was four miles wide, was connected to the sea by a fixed channel having an average depth of 125 ft. and that from Davenport there reached out in four directions fairly deep waterways, never frozen, whose aggregate length totaled 30,000 miles and whose seasonal stages could be predicated with great accuracy.

This is the condition that prevails at Manaos, a city of 50,000 people, well above the 40 ft. annual highwater stage of the river, a city which forty years ago was carved out of the forest and supplied with modern sewerage, waterworks, electricity, paved streets, habitable houses and an opera house more pretentious than New York City possesses. It is a natural center for a territory comprising 50 percent of Brazil as well as a large part of Colombia, Peru and Bolivia. Its sole means of access is by river or by airplane yet it is really a seaport accessible by ships of 8,000 tons while Iquitos, in Peru, 2,300 miles from the sea is served by ships from England of 3,000 tons.

Climatic conditions

It is unfortunate that sensational reports have blackened the climatic conditions that exist in Amazonas. The trouble, years ago, was that rubber brought a high price, something like 18 shillings a kilogram, the States of Amazonas and Para levied a 20 percent export tax on it and the idea of everyone that went into that section was to make as much money as possible in a short time and then take it somewhere else.

Malaria, did, and still does exist, to a certain extent, outside of the larger towns and neglect of sanitation could lead to the recurrence of yellow fever, but bad health conditions in Amazonas were due mainly to wrong diet and bad housing rather than to climate. The writer knows from experience that the climate of the Amazon is far superior to that of the lower Mississippi valley and that the heat in any of our large cities is far more uncomfortable than that in Manaos or Belem.

The only thing that ever worried the writer while away from Manaos or Belem was the inaccessibility of medical skill in case of necessity such as might arise from appendicitis or other sudden attack of organic malady. However, nothing ever happened calling for a surgeons skill.

The fact is, that during the time that rubber was king, there were men who went into the far corners of this territory and built themselves small empires and were self-sufficient. One dynasty of brothers came there from Portugal and setting up their realm on the Putumayo River, on the frontier between Peru and Colombia, accumulated considerable wealth and surrounded themselves with every comfort. They maintained shops and shipyards and even their private army. It is probably correct to state that even today there are other hidden empires there run by men who prefer to live apart from cities or contact with the outer world.

Some twenty-five years ago Brazil ceded a tract of 10,000 square kilometers, on the Amazon, near Obidos, to a Japanese colony; since that time this colony has spread and another now exists at a place called Monte Alegre, about 100 miles from the Ford rubber plantation near Santarem.

There is evidence that the Phoenicians frequently visited the Amazon and below the mouth of the Madeira there is a rock fashioned like the prow of a galley upon which are marks pointing to the Madeira, the Rio Negro and to the upper Amazon. In fact the river, beyond Manaos, is known as the Solimões (the Solomon). This name was taken from the aboriginal Indians who lived there; the conjecture is that they obtained it from the Phoenicians. Even in Rio de Janeiro, thousands of miles from Amazonas, there is a mountain, Gavea, upon whose granite sides there are the remains of a colassal head evidently sculptured by Phoenicians.

Postwar implications

While the present interest in Amazonas is due to the desire for rubber, it is hoped that this interest will not die out as heretofore. The Amazon basin comprises a territory of greater extent than the East Indian empire upon which the Japanese have laid violent hands and is just as valuable and much nearer to us. In addition it is the patrimony of a people who think more or less as we do, have the same love of personal liberty and with whom it is not at all difficult to cooperate.

For these reasons it might be well for us to consider what might ensue for the common welfare, if a study were commenced which would lead to the development of the inland waterway indicated herein.

Moisture Barriers Prevent Condensation in Walls

The accumulation of condensation in the walls of air-conditioned frame houses may be avoided by the use of moisture barriers, according to the National Bureau of Standards, Department of Commerce.

The widespread application of air conditioning to houses to promote better health and greater comfort brought with it the problem of how to keep moisture out of the walls.

Vapor from the warm, humidified inside air under certain conditions enters the walls and often accumulates there during cold weather to an extent that may cause serious damage.

The Bureau of Standards has studied the problem in cooperation with the Insulation Board Institute by actually observing what took place inside the north wall of a frame house during winter weather while a relatively high humidity was maintained inside the house.

As explained in Building Materials and Structures Report BMS93, condensation within walls can be avoided by using a vapor barrier to prevent the moisture from entering the walls from the warm side. In instances where this type of protection was not employed, condensation occurred during an exposure of two weeks duration in Washington, D. C., in moderate winter weather.

Tests showed that there was no basic difference between the performance, with respect to the accumulation of moisture, of walls of standard wood construction and those in which fiber sheathing boards were used. In all instances of condensation, the accumulation of moisture was greatest in the lower portions at or near the sills, where decay would be serious.

Copies of BMS93 may be obtained from the Superintendent of Documents, Washington, D. C., at 10 cents.

Single Wall System of House Assembly

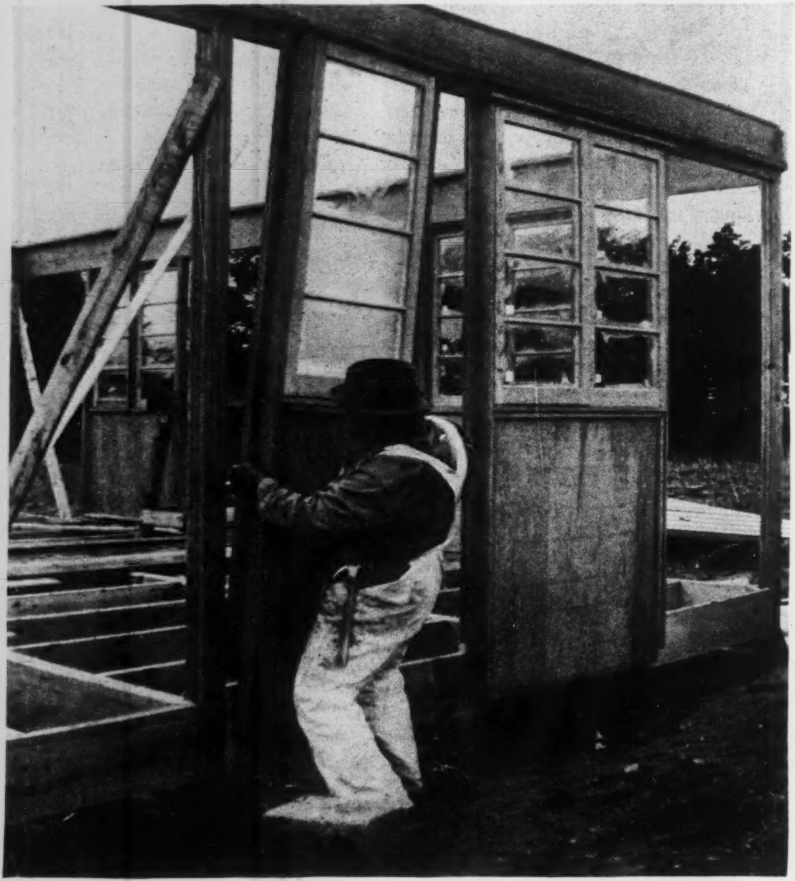


Fig. 1. Preassembled vertical wall panels speed erection of war housing.

Samuel Paul
Matern, Graff & Paul,
New York City

Contents in Brief—*An erection system based on the use of vertical, single wall panel units coupled with assembly procedures utilizing both site and factory fabrication facilities is the most recent development in war housing. Columns and girders serve as the principal structural wall members, but window and door trim as well as the window panels also function as supporting members. The single wall material consists of a 1 in. core of rigid insulation board laminated on both sides with plywood.*

A NEWLY DEVISED SYSTEM of construction, in which the use of single wall panels are featured, was employed for the erection of 500 demountable houses in the Newport News, Va. area recently. The most significant results obtained were ease of erection, minimum use of critical materials, minimum waste, and flexibility in design.

The houses were partly factory-fabricated and partly site-fabricated. The rough lumber units such as floor framing panels, roof trusses, sheathing panels and ceiling nailers were assembled on jigs in a temporary canvas-covered shelter conveniently located on the site. Finished units such as columns, girders, windows, doors, facia, gutter, exterior and interior wall panels and interior millwork were manufactured in a factory and shipped to the job ready.

Matern, Graff & Paul of New York City designed and developed the structural system and the plan layout. Every operation including architectural drawings, field fabrication drawings, factory fabrication drawings and erection drawings thoroughly detailed. In many cases rendered isometric drawings were provided to clarify an assembly process or an erection detail. All the drawings were put on 8½ x 11-in. sheets and were assembled in booklet form for use on the job. C. M. Guest & Sons of Anderson, S. C., were the contractors on the work.

General arrangement

Three types of houses were built—a one-bedroom unit, 24x24 ft. in plan; a two-bedroom unit 24x28 ft.; and a three-bedroom unit 24x32 ft. They all contained a combination living and dining room, kitchen, bath, storage space and adequate closets, besides the designated number of bedrooms. The two-bedroom units were predominant. All the houses were single story, dual units.

As shown in the floor plans, the living room, dining alcove, kitchen and even the storage space flow together to give the impression of spaciousness and openness; it should be noted, however, that the kitchen and storage is well-shielded from the living room. The partition between the dining alcove and the storage space does not go to the ceiling. Doors were used only for the bedrooms and bathroom and, in a very few cases, for closets. An exterior feature was the use of 13 ft. of continuous glass on the end elevation with a covered porch (4x8 ft.) and trellises.

Structural design features

Outstanding characteristic of the construction is its functional appearance. For example, the main structural wall members such as the columns and girders are exposed on the interior and are decorative. The sys-

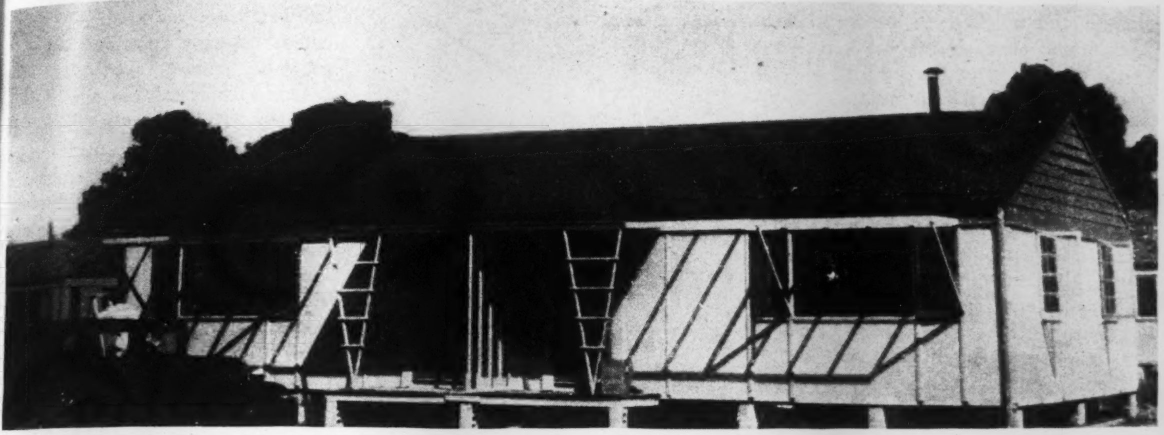


Fig. 2. Complete accommodations for two families are provided in each dwelling unit, one of which is shown almost at the stage of completion.

tem of construction is basically post and lintel. All window and door trim perform a structural function.

Window panels, which come to the job completely assembled with hardware, screen and one coat of paint, act as supporting members. The load is transferred from a wood girder to the head of the window and thence down through the jambs to the floor beams and foundation. Typical window units are 4 ft. and 2 ft. wide and 8 ft. high. Milled columns $3\frac{1}{2}$x$3\frac{1}{2}$ in. are placed 4 ft. from the window units provided that another window unit does not occur within this spacing. As a result the average roof girder spacing is 4 ft.

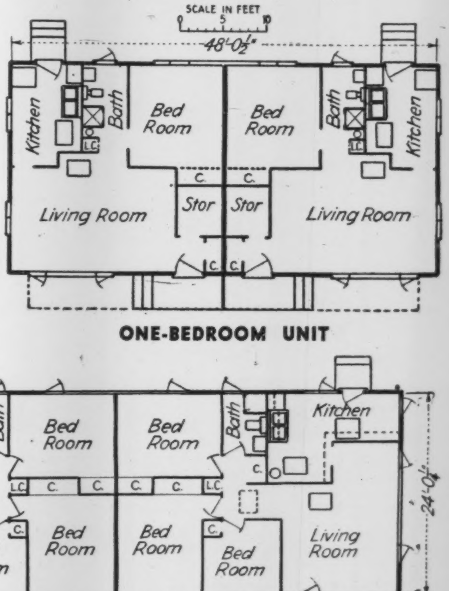
The exterior wall panel is only $1\frac{1}{2}$ in. thick. It consists of a 1-in. core of rigid insulation board laminated on both faces with $\frac{1}{4}$-in. Douglas Fir plywood; the exterior plywood is hot-pressed and made with a waterproof glue. Insulating qualities of this wall are superior to that of an uninsulated brick veneer wall of standard construction.

The wall panel is applied vertically and fastened to the framework by means of screws driven in with a hammer around the periphery of the panel. At the top the panel is screw-nailed to the girder, at the sides it is screw-nailed to the window jambs and columns, and at the bottom it is fastened to the floor joists. Most of the panels are 4x8 ft. in size. Since plywood has now become a critical material, gypsum, pressed wood, asbestos-cement and linoleum are now being used for the exterior facing on the panels.

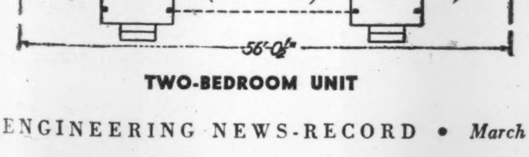
Floor framing panels were made up in the site shop on jigs. They were set on concrete block piers and held together by wood dowels. A sub-floor of $\frac{3}{4}$-in. vapor-sealed rigid insulation was tacked to the floor framing; this material was supplied in panels of 4x12 ft. Prefinished oak flooring, $\frac{25}{32}$ in. thick, was blind nailed through the insulation into the floor framing.

After the floor was down, the columns, windows and girders, doors and exterior wall panels were then erected. Simple Fink trusses, with no member larger than a 2x4, were used to span the 24-ft. width of the house. The trusses were fabricated in a site shop where a crew of sawyers cut to

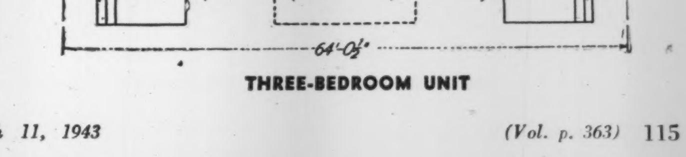
Fig. 3. Three types of floor layout were used, a one-bedroom unit, 24x24 ft. in plan; a two-bedroom unit 24x28 ft.; and a three-bedroom unit 24x32 ft., otherwise the layouts are practically the same. The three plan schemes as developed afford an ample living space in relation to the service units of the house.


SCALE IN FEET
0 5 10
48'-0½"
Kitchen
Bath
LC
Bed Room
Bed Room
Bath
LC
Kitchen
C.
C.
Living Room
Stor
Stor
Living Room
C
C

ONE-BEDROOM UNIT


Kitchen
Bath
Bed Room
Bed Room
Bath
LC
Kitchen
LC
C
C
C
C
C
C
Living Room
Bed Room
Bed Room
Living Room
56'-0½"

TWO-BEDROOM UNIT


0 5 10
SCALE IN FEET
Kitchen
Bath
Bed Room
Bed Room
Bath
Kitchen
C
LC
C
C
C
C
LC
C
Living Room
Bed Room
C
Bed Room
Bed Room
C
Bed Room
Living Room
64'-0½"
24'-0"

THREE-BEDROOM UNIT

length and notched all the members. Assembled on a jig table, the trusses were completed at the rate of 115 a day. Spaced 2 ft. on centers, they were erected at the rate of 1¼ minutes per truss.

The two end trusses varied slightly from the intermediate trusses, in that siding was applied to them in the site shop. The upper pieces were bowed-out to furnish ventilation, after which the rake and eaves vent members were applied.

Also assembled in the site shop were the roof sheathing panels. These consisted of 1x8-roofers held together with 2x2-in. cleats placed 2 ft. on centers. The cleats were nailed to the sides of the upper chords of the trusses. Asphalt shingles were applied to the sheathing panels.

Ceiling panels 4 ft. square and of ¾-in. thick rigid insulation with one side finished, were inserted into T-shaped wood splines that were nailed to the bottom of the trusses.

In laying out the interior partitions, the door frames with overdoor piece and hardware that came to the job preassembled, were the first to be erected (Fig. 3). With these in place the partitions automatically were located. Interior partitions were ½-in. plywood panels.

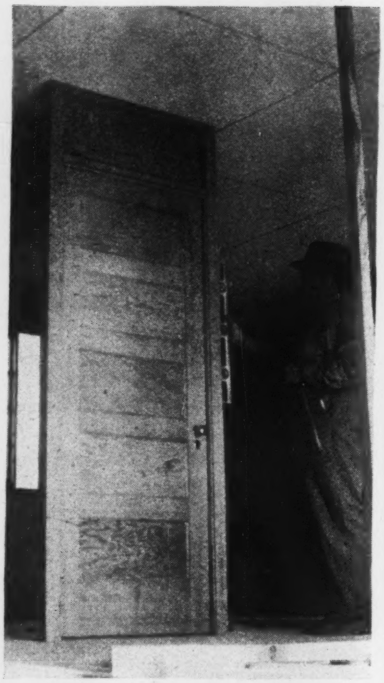


Fig. 3. In laying out the interior, complete door assemblies were first erected and then the partitions were put in place.

One corner of the site shop was devoted to plumbing activities. Here the rough plumbing members were cut to length and assembled into workable units. Two field men installed the rough plumbing at the rate of 3 hours a house. A centrally located coal-fired space heater provides adequate heat for the entire house.

In order to speed erection the field men were organized into crews. The foreman of each crew was given erection diagrams relating to the specific task that his crew was to perform. After the crews became proficient in their operation they averaged construction of twenty houses a day.

In conclusion, it should be noted that the vertical system single wall type of construction has features of flexibility that readily adapt it for use in the erection of dormitories, or even apartment dwellings. The system has been approved by the Federal Public Housing Authority for use on its projects.

City Planning Agencies Playing Important Part in War Effort

City planning agencies got full experience last year in their double role of laying out for present needs and predicting for the future as they were called upon to solve current problems in war housing and community facilities, with an eye to fulfilling after-war needs wherever possible.

Activities of a majority of the 1,200 local planning bodies during 1942 fell into two classifications, according to the American Society of Planning Officials. First, work in connection with actual war problems ranging from roads to housing. An example was the close cooperation between the Denver plan commission and the Army headquarters in that area in solving army planning problems.

Second, preparation of capital budgets and public works programs for post-war operation. This work was taken over by the local governments when the Federal Public Work Reserve, which stimulated it, went out of existence

Zoning laws relaxed

Zoning, long familiar planning tool for regulating land-use, gained new prominence in 1942 as temporary modifications were made in existing ordinances to meet demands of the national homes use program for accommodating war workers. Those cities making concessions, according to the society, are relaxing zoning regulations for the duration only, so that their land-use programs will not get out of control after the war.

In connection with postwar planning, a number of city plan agencies urged that surpluses accruing because of declining municipal employee lists and inability to obtain construction material should be used to prepare plans and build a financial backlog for the future. Some planning agencies adopted the viewpoint that existing tax rates should be maintained because people at present have "the ability to pay." and because the maintenance of tax rates will help in a small way to avoid inflation.

Urban rehabilitation

The problem of urban redevelopment after the war received increasing attention in 1942, the society said. Kentucky followed the lead of New York, Illinois and Michigan in passing an urban redevelopment act. In Detroit, a specific proposal for redevelopment of a site of 111 acres was formulated for operation under the Michigan redevelopment corporation law Net cost of the site is estimated at $3,520,000, or a unit cost of 71 cents a square foot of land which already is supplied with utilities, streets and alleys. Detroit would contribute $739,000 to the project in the form of land for street widening and park and recreational purposes.

Beam-Method of Design For Eccentrically-Loaded Columns

Odd Albert
Assistant Professor in Structural Engineering
Newark College of Engineering
Newark, N. J.

Contents in Brief*—A direct method of design for eccentrically loaded columns, in place of the trial procedure ordinarily used, is possible by transposing the column section into a comparable beam section and solving as for a beam. Essential step are to move eccentric load onto the tension steel, add enough steel area to take care of it, and to replace the effect of the eccentricity by a moment. Then if the column section is rotated 90 deg. it becomes a beam, and can be solved as such. This design method was first presented by the author last May in a lecture before the school of engineering, Princeton University.*

IN THE DESIGN of reinforced concrete members subject to bending only, for instance a beam, it is customary to determine the dimensions directly, using formulas based upon the allowable stresses. But if a member is subject to both bending and compression, with tension over part of the section, for instance a column, a comparably direct design method has not been available. Instead, most textbooks recommend a trial method, by which, for the given load conditions, a section with assumed reinforcement is made up, and the resulting stresses determined. If these stresses are found to be too far off from the given stresses, a new section is made up, the stresses are figured again, and so on. (See Peabody, The Design of Reinforced Concrete Structures, Pages 237-240; Dunham, Theory and Practice of Reinforced Concrete, Pages 178-179.)

To overcome the disadvantages of such a procedure, a method is presented herein by which a column subject to bending and compression, with tension over part of the section, can be designed with the use of ordinary beam formulas. Called, for convenience, the "Beam-Method for the Design of Columns," it is mathematically correct and leads directly to the results.

In designing columns by present methods the tensile stress caused by eccentric loads is assumed to be taken by the tension steel alone. For example in Fig. 1 a column is shown with a load N applied in such a way as to cause tension. This eccentric load N may be replaced by a centric load N and a moment $M = Ne$, if e represents the eccentricity, as also shown in Fig. 1 (right).

The following relations between the internal and external forces exist, because the sum of all vertical projections must equal zero:

$$N = 1/2\, f_c bx + A'_s f'_s - A_s f_s \qquad (1)$$

And, because the moments around the centerline must equal zero—

$$M = 1/2\, f_c bx\,(h/2 - x/3) + A'_s f'_s r + A_s f_s r \qquad (2)$$

It is obvious that

$$\frac{f_s}{nf_c} = \frac{d - x}{x}$$

$$\text{so } f_s = \frac{nf_c\,(d - x)}{x} \qquad (3)$$

and that

$$\frac{f'_s}{nf_c} = \frac{x - d'}{x}$$

$$\text{so } f_s' = \frac{nf_c\,(x - d')}{x} \qquad (4)$$

These four equations contain four unknowns f_s, f_s', f_c, and x. By solving them simultaneously and by eliminating f_s, f_s' and f_c, an expression for x is obtained. Being of the third power, however, it is not so easy to solve, yet its solution is necessary before the stresses may be determined.

In the proposed beam method the condition shown in Fig. 1 may be represented by assuming the load N applied over A_s and by using a moment $M_s = Nt$, as shown at the left in Fig. 2.

By such a procedure, the column subject to bending and compression will change into a beam, subject to bending only, as shown at the right in Fig. 2, if a certain amount of tension steel A_{s2} is added, which must be used to engage the load N, utilizing the prevailing steel stress f_s.

We then have

$$A_{s2} f_s = N, \text{ or } A_{s1} = A_s + N/f_s \qquad (5)$$

which means, that A_{s1} will take care of stresses resulting from the moment and A_{s2} will take care of the applied load N.

It is obvious that the values of f_s, f_s', f_c and x, shown in the column, must be the same in the beam. It is also obvious that these values are more easily figured by using the beam in place of the column.

For a beam the neutral axis is located by the value $x = kd$, and this value is given by the formula

$$x = \sqrt{A^2 + B} - A \qquad (6)$$

where

$$A = n/b\,(A_s' + A_s)$$
$$\text{and } B = 2n/b\,(A_s'd' + A_s d) \qquad (7a, b)$$

The concrete stress therefore, may be represented by

$$f_c = \frac{M}{\frac{bx}{2}\left(d - \frac{x}{3}\right) + \frac{nA'_s\,(x - d')\,(d - d')}{x}} \qquad (8)$$

the steel stress by

$$f_s = \frac{nf_c\,(d - x)}{x} \qquad (9)$$

and the compression steel stress by

$$f'_s = \frac{nf_s\,(x - d')}{x} \qquad (10)$$

Using these formulas the following procedure can be used to obtain the reinforcing in a column subject to compression and bending with tension over part of the section:

Figure the tension steel area for an ordinary beam with the same dimensions as the column, using the moment M_s. Deduct from this tension steel area an area equal to the load N divided by the working steel tension stress f_s. The result is the tension steel area in the column.

Figure the compression steel area for the beam with the same dimensions as the column, using the moment M_s. The result is the compression steel area in the column. The "beam-method" cannot be applied readily for the determination of the stresses directly from known dimensions on account of the term N/f_s, which contains the unknown value f_s. However, it is easily applied and very useful for checking stresses, or for cases in which the steel stress can be assumed first.

The following problem will illustrate the method. A 12 x 22 in. column takes an eccentric load of 24,000 lb., applied 26 in. from the center. If the steel areas are A_s = 1.184 sq. in. and A_s' = 1.330 sq. in., and if d' = 2 in., n = 15, and the unit design stress is 20,000 psi., find the stresses. In Fig. 3 these conditions are shown at the left while at the right the column is shown as a beam.

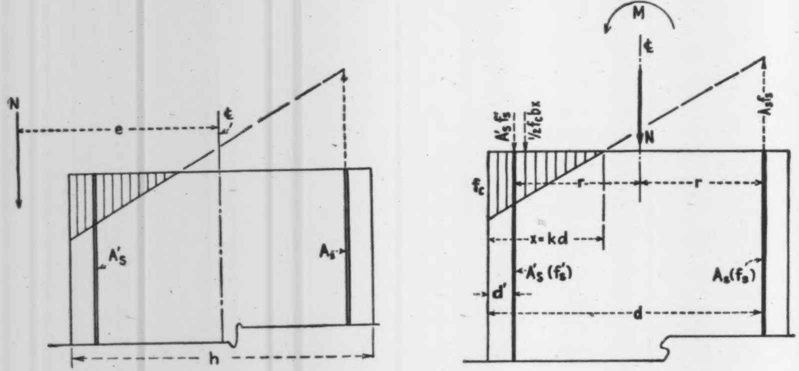


Fig. 1. In setting up equations in usual design procedure, column loading condition (left) is replaced by equivalent condition (right) in which eccentric load N is replaced by axial load N and a moment Ne.

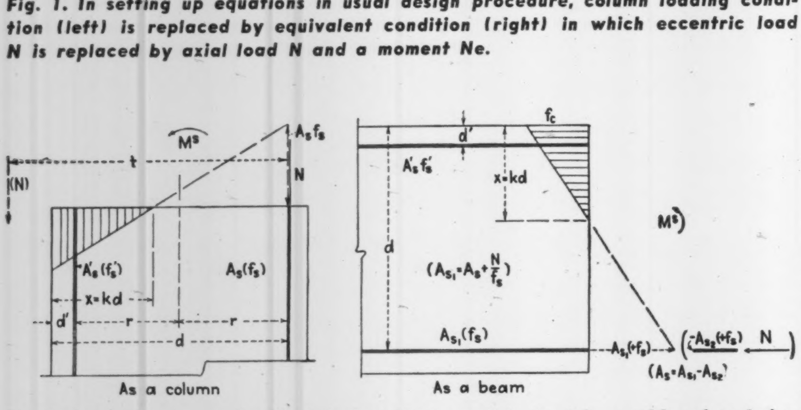


Fig. 2. In the "beam method" of design, the eccentric load is considered as being replaced by an equal load acting on the tension steel and a moment Nt, as shown in left diagram. Then the column section is rotated ninety degrees (right) and considered as a beam.

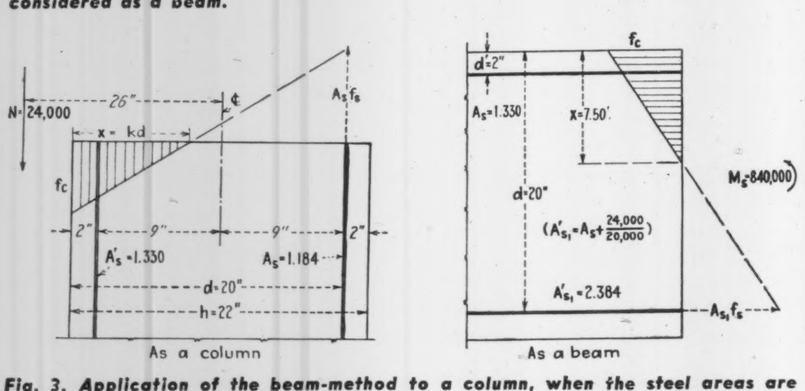


Fig. 3. Application of the beam-method to a column, when the steel areas are given and it is desired to determine stresses in the concrete and the steel.

The first step is to change to "beam-design" by (1), taking moments with reference to A_s resulting in M_s = 24,000 (26 + 9) = 840,000 in.-lb; and (2) adding steel tension area engaged by load of 24,000 lb. applied in A_s or N/f_s = 24,000 / 20,000 = 1.2 sq. in. Therefore, A_{s1} = 1.184 + 1.200 = 2.384 sq. in.

It is now possible to use the beam in Fig. 3, right, to determine the neutral axis and the stresses. These values will then be the same for the column as given in the problem:

The neutral axis is determined from Eqs. (6) and (7). Thus,

$$A = 15/12 \times (1.330 + 2.384) = 4.64$$
$$B = 2 \times 15/12 \times (1.330 \times 2 + 2.384 \times 20$$
$$= 125.8$$

so

$$x = \sqrt{4.64^2 + 125.8} - 4.64 = 7.50 \text{ in.}$$

Finally the concrete stress from Eq. 8 is

$$f_c = \frac{840{,}000}{\frac{12\times 7.5}{2}(20-\frac{7.5}{3})+\frac{15\times 1.330(7.5-2)(20-2}{7.5}}$$
$$= 800 \text{ psi}$$

and the steel stress from Eq. 9 is

$$f_s = \frac{15 \times 800\,(20 - 7.5)}{7.5} = 20{,}000 \text{ psi.}$$

This value of f_s checks with the assumed value of f_s, used when the quantity N/f_s was figured in order to determine the tension steel area A_{s1}.

Design for given stresses

If the stresses are given and the dimensions are sought, the "beam-method" will get the results directly and correctly. It makes no difference whether tension and compression steel is used, or tension steel only.

When the stresses are known, it is obvious that the neutral axis is fixed. Therefore, with $x = kd$, the following well known formulas apply:

$$k = \frac{nf_c}{nf_c + f_s} \qquad (11$$

and

$$j = 1 - k/3 \qquad (12.$$

Tension steel only—For the "beam-design" use $M_s = Nt$ and $A_{s1} = A_s + N/f_s$

For known stresses the minimum effective depth d of the column for tension steel only will, therefore, be

$$d = \sqrt{\frac{M_s}{Kb}} \qquad (13)$$

and the tension steel area in the beam becomes

$$A_{s1} = \frac{M_s}{f_s\,jd} \qquad (14)$$

The tension steel area in the column is, therefore,

$$A_s = \frac{M_s}{f_s\,jd} - \frac{N}{f_s} \qquad (15)$$

using the constant $K = 1/2\ f_c\ kj$ as given in standard concrete tables.

As an example, assume a column 12 in. wide is to be designed to take an eccentric load of 24,000 lb., 26 in. from the working line, the distance to the back of the column from this working line being 11 in. It is required to find the depth of the column if only tension steel is used and also to find the amount of tension steel. The allowable stresses are $f_s = 20{,}000$ psi, and $f_c = 800$ psi.; further $r' = 2$ in. and $n = 15$. Also for the stresses given, the constant K can be found from tables to be 131.3.

For the "beam-design" use $M_s = 24{,}000 \times 35 = 840{,}000$ in. lb. so the minimum effective depth with tension steel alone becomes

$$d = \sqrt{\frac{840{,}000}{131.3 \times 12}} = 22.1 \text{ in.}$$

and the tension steel area in the column is

$$A_s = \frac{840{,}000}{20{,}000 \times 22.1 \times 0.875} - \frac{24{,}000}{20{,}000}$$
$$= 1.97 \text{ sq. in.}$$

Tension and compression steel.—In Fig. 5 is shown a column with both tension and compression steel subjected to an eccentric load N applied at a distance e from the centerline of the column. The first step is to move this load over A_s and add a moment $M_s = Nt$. This condition is shown in Fig. 5 (center).

Now for the "beam-design" (Fig. 5, right) use

$$M_s = Nt$$

and

$$A_{s1} = A_s + N/f_s$$

and determine the steel areas as if only an ordinary beam were being considered.

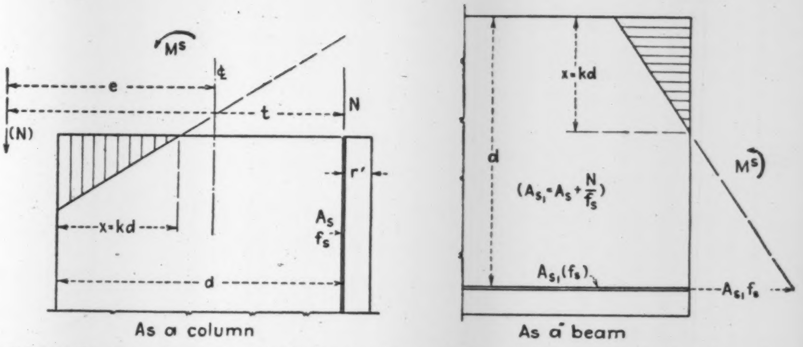


Fig. 4. Design of an eccentrically loaded column with tension steel only, when the stresses are given and it is required to determine the steel area and the effective depth or thickness.

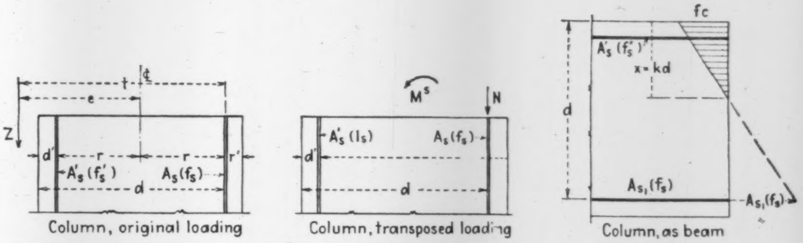


Fig. 5. Steps in applying the beam-design method to a column with both compression and tension steel. Stresses are given, and steel areas and column thickness are desired.

A moment equation around the compression steel gives

$$M_s = f_s A_s (d - d') + 1/2 f_c bx\,(x/3 - d') \qquad (16)$$

so the tension steel in the beam becomes

$$A_{s1} = \frac{M_s + 1/2 f_c bx\,(x/3 - d')}{f_s\,(d - d')} \qquad (17)$$

A moment equation around the tension steel area gives

$$M_s = A'_s f'_s (d - d') + 1/2 f_c bx\,(d - x/3) \qquad (18)$$

so the compression steel area in the beam becomes

$$A'_s = \frac{M_s - 1/2 f_c bx\,(d - x/3)}{f'_s\,(d - d')} \qquad (19)$$

Therefore, the compression steel area in the column is A_s' while the tension steel is

$$A_s = A_{s1} - N/f_s \qquad (20)$$

It is interesting to note that the load N could also be moved to A_s', in which case the moment is marked M_s'. It is evident that

$$M_s' = Nx\,(e - r)$$

In this case the "beam-design" method will give the tension steel area direct, while the compression steel area must be increased by N/f_s'.

As an example, when both tension and compression steel are used, assume a column 12 in. wide and 22 in. deep subjected to an eccentric load of 24,000 lb., applied 26 in. from the centerline. If $d' = 2$ in., and the allowable stresses are $f_c = 800$ psi. and $f_s = 20{,}000$ psi., and $n = 15$, find the reinforcing. This example is shown in Figs. 3 and 5. The minimum depth for tension steel only was found from the preceeding example to be 22.1 in. Therefore, the compression steel is required.

For the stresses given, $k = 0.375$, so $x = 0.375 \times 20 = 7.5$ in. Therefore, the compression steel stress becomes

$$f'_s = \frac{15 \times 800}{7.5}(7.5 - 2) = 8{,}800 \text{ psi.}$$

For the "beam-design" use $M_s = 24{,}000 \times 35 = 840{,}000$ in. lb. Therefore, the steel areas in the beam become:

$$A_{s1} = \frac{840{,}000 + 1/2 \times 800 \times 12 \times 7.5\,(2.5 - 2)}{20{,}000\,(20 - 2)}$$
$$= 2.384 \text{ sq. in}$$

and

$$A_s = \frac{840{,}000 - 1/2 \times 800 \times 12 \times 7.5\,(20 - 2.5)}{8{,}800\,(20 - 2)}$$
$$= 1.326 \text{ sq. in}$$

And finally the steel areas in the column are:
$A_s = 2.384—24{,}000/20{,}000 = 1.184$ sq. in. and $A_s' = 1.326$ sq. in.

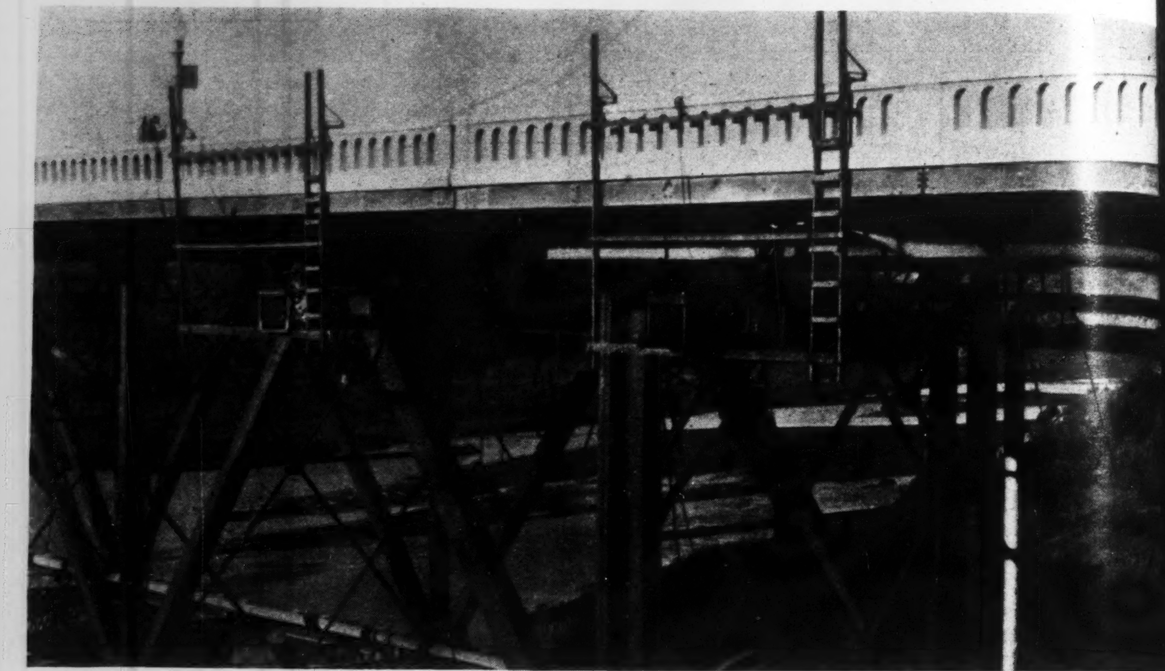


Fig. 1. Typical form of scaffold where a suspension type of staging is required.

Bridge Paint Maintenance

T. H. Dennis

Maintenance Engineer, California Division of Highways

***Contents in Brief**—Specialists in a department that has been kept separate from other maintenance work since 1930, renew and maintain the paint on bridges of the California state highway system. Seasonal advantages in different localities are recognized, paint formulas are now well established, and teamwork has reduced field operations to a professional routine. Paint is applied by spray gun after steel has been sandblasted to bright metal.*

FOR TWELVE YEARS paint on bridges of the California highway system has been maintained and renewed by crews assigned to this work exclusively so that specialists could be developed. The crews move north or south to gain seasonal advantages and methods are adapted to different types of structures or to local conditions, but always the same standards and objectives are maintained. As a result, cleaning and painting operations have been reduced to a simple routine and many improvements in methods, equipment and materials have been developed.

The crew includes a bridge superintendent, a foreman, a timekeeper, two structural steel painters and seven skilled laborers, six of whom sandblast and paint. The seventh performs general work about camp such as mixing paint, repairing hose and spray guns and servicing compressors. This crew can work either as one or two separate units and is supplemented by unskilled laborers, hired locally, numbering six or more to provide watchmen, flagmen, and men for handling sand or staging.

When divided into two crews, No. 1 uses a relatively light portable outfit mounted on truck and trailer that moves daily to and from the work out of the nearest town or highway maintenance station, while No. 2, somewhat less mobile, is moved with heav truck and trailer units, and usuall remains at the bridge site until th maintenance job is finished.

These crews, with such replacements as have been necessary sinc organization in 1930, have sandblasted and painted 105 of the 45 steel structures on the California stat highway system. Expressed in othe terms, the work done has totalle 11,125,000 sq. ft. of sandblasted surface on which 7,450 tons of sand an 17,100 gal. of paint were used.

Painting programs are made u annually, and are based on the recommendation of the bridge department supported by the bridge superintendent's personal estimate of th work and materials required. Eac structure is considered a separat project for which estimates, allotments and final report (with unit cos analysis) are made up. This gives a collection of data useful for comparisons and checking.

ttention to seasonal variations is ortant because of the wide cli- c range within California's boun- es, and the resulting effect on ting costs. Bridges along the h coast are painted between June September, central valley struc- s between October and January south coast bridges between Feb- y and June.

Sandblasting equipment

andblasting is the most expensive in bridge painting and the effi- cy of the sand nozzle is of utmost ortance. Experience with a spe- ¼-in. metal core sandblast nozzle, wn in an accompanying illustra- , has been particularly satisfac- . The orifice of this nozzle has wn an average increase of only in. after 100 hr. of service. A nozzle will use 1½ tons of sand n 8 hr. operation and when this unt is exceeded by 50 percent, nozzle is replaced. It has been nd desirable to check daily the ount of sand used in each sand- hamber and the diameter of the zzle orifice.

A recent improvement in the nozzle a shut-off valve at the tip. This es sand and permits the operator inspect the work or move staging thout shutting off at the sand hamber. It also is a safety meas- by eliminating the hazard of directed flying sand.

Sand for sandblasting is purchased a specially dried form packed in ks. Although this represents a t several times that of bulk sand, ultimate cost is much less than bulk sand had to be dried and eened on the job. Specifications quired that 95 to 100 percent of sand used pass a No. 20 sieve; t 0 to 20 percent pass a No. 30 ve; and that 100 percent will be ained on a No. 40 sieve.

The sand is loaded by laborers into pressure chamber whence two guns e served through a Y-connection on e outlet line. Cutoff valves are cated in each line just beyond the -connection and thus one tender at e sand chamber can control the w to two guns.

Flexible connections save time

Flexible hose connections greatly duce the time of making and break- g connections to air lines from sand hambers that must be removed from e bridge deck for the safety of

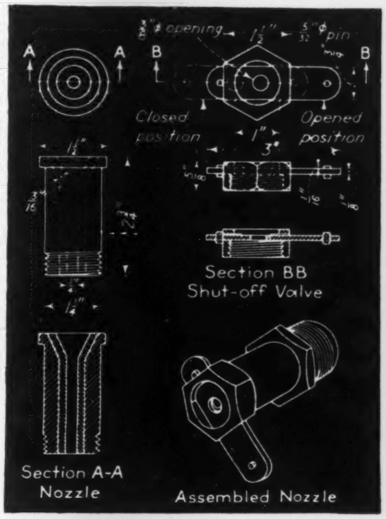


Fig. 2. Details of improved sandblast nozzle with cut-off valve. The cut-off at the tip speeds the work materially.

travellers at the close of each day's work. Similarly, flexible connections are particularly valuable in the lines laid on bascule structures. On this type of bridge, the 2-in. metal airline is stopped on either side of the hinge and a flexible connection across the hinge is made with rubber hose. Since many openings of the bascule do not require full lift, the flexible connection often makes it unnecessary to break hose connections and suspend painting operations. When full opening is required, the connectors simplify make-and-break operations.

Oil-burning, dehydrating torches with nozzles of different types are sometimes used for applying heat to drive moisture from steel in advance of prime coat application. The dehydrating outfit is used chiefly along the coast in regions subjected to fogs.

Equipment for sandblasting and spray painting minor steel structures of less than 20,000 sq. ft. area and for painting major structures is given in Table III. In Table IV is listed equipment ordinarily used for sandblasting and spray painting major steel structures of more than 20,000 sq. ft. painted area.

The paint agitator, an extremely important item in the equipment, is an airdrill mechanism adapted to drive a shaft mounting a 6-in. propeller. The shaft extends through the cover of a standard paint container and its speed and direction of rotation can be regulated as desired. One of the agitators is shown in Fig. 6.

Types of staging

Stagings or catwalks are of two types; those used above deck on truss-type bridges and those that are suspended below the floor system. Usual practice is to make the length of

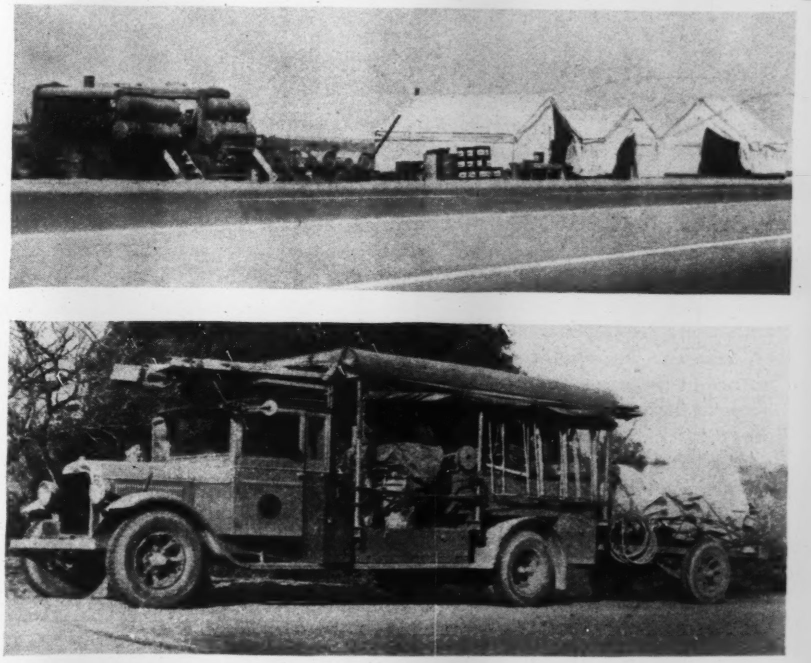


Fig. 3. A camp used by the larger crews with heavy equipment is shown in the upper view. Below is the equipment for a more mobile unit, packed for transit.

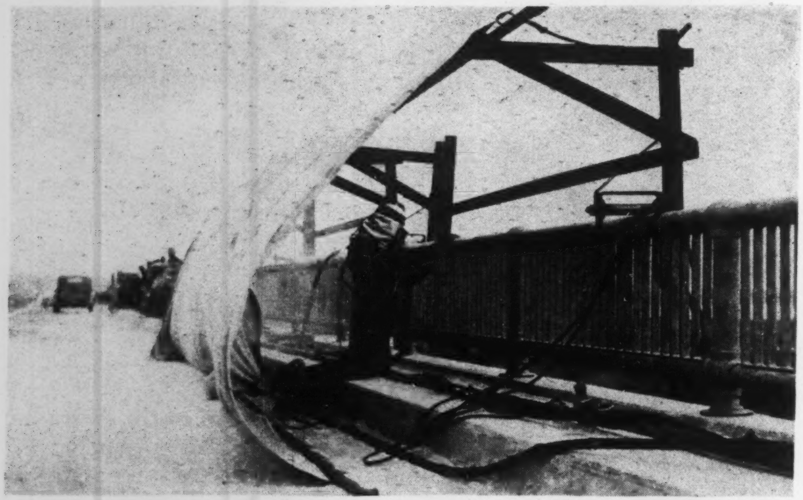


Fig. 4. In sandblasting above deck, shields are set up to protect traffic from flying particles. Similar protection is provided against paint spray.

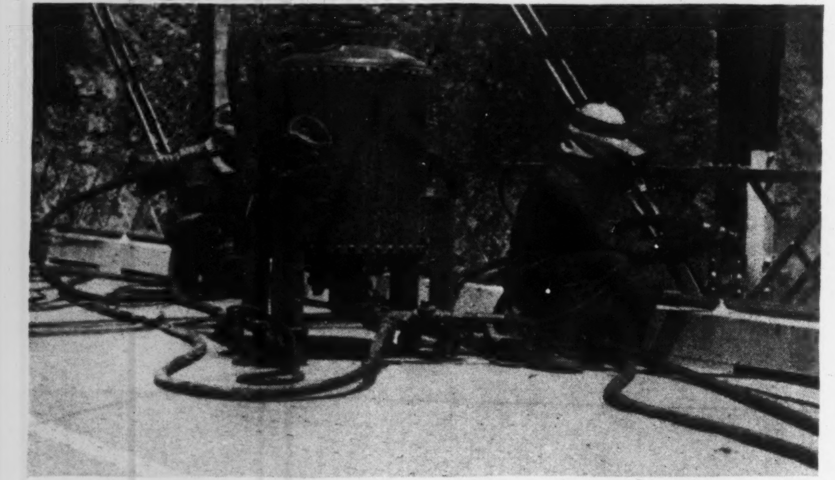


Fig. 5. When it is necessary to have two operators work from one sandblast chamber, a Y-connection is inserted in the supply line below the chamber.

staging for use above deck somewhat less than panel length in order to clear the plumb posts and sway bracing. Above decks they are usually slung by double sheaved block and tackle from panel points of the top laterals. Triangular hangers with an eye at the apex are recommended because the hook on the block is less likely to disengage from the eye of such a hanger.

Catwalks for use below the deck are preferably built longer than the deck width and for lengths up to 35 ft., 3x6-in. stringers have been found suitable. They are supported by needle beams slung by adjustable steel hangers or straps with holes that match, providing a 24-in. extension. The angle for hangers to rest on top of one of the bottom chord members is heavily reinforced to prevent risk of straightening under load. Above this reinforcing is a handle by which the hanger can be moved. If the catwalks are to be suspended from a pipe rail, the hanger is made of 2-in. pipe so that it can be readily rolled along the rail.

On bridges whose decks exceed 32 ft. in width, it has been found advantageous to swing an auxiliary catwalk from the I-beam stringers of the floor system as a support for one end of the main catwalk. Thus one end remains free to be moved along the auxiliary catwalk as desired. Where there is sufficient water under the bridge, the catwalks can be most easily floated into position and then raised to place by means of do sheave block and tackle.

Specifications for paint

Paint specifications that demonstrated their suitability California conditions over a ten period have now been simm down to the proportions and i dients listed in Tables I and II. leafed metallic lead paste referr in these tables consists of a mini of 90 percent flaked metallic plus or minus 9 percent mi spirits, and plus or minus 1 pe stearic acid. It is required to b smooth consistency, free from l and it must pass the following ness specification: maximum reta on a 100-mesh screen, 2 perc maximum retained on a 200- screen, 11 percent; maximum tained on a 325-mesh screen, 20 cent.

A good spray painter is abl coat 200 to 300 sq. ft. of surfa an hour as compared to the 8 100 sq. ft. that can be cleaned b experienced sandblaster in the s time. A factor in this differen rates is the requirement that the be sandblasted to bright metal ra than stopping at the bloom.

A typical paint job

The day-to-day routine in typical paint job varies little but setup of equipment and the star sandblasting and cleaning operat involve many features that have simplified by long experience. illustrate the sequence that has developed, the following outline work on an actual job is recorde

A bridge to be painted crosse navigable waterway and has a t length of 586 ft. including two tr nion bascule lift spans, two coun weight spans and two truss sp The work order calls for sandblast and applying primer and second paint to 68,000 sq. ft. of surface and a finish coat to the entire st ture of some 78,000 sq. ft.

Materials including lumber staging, tent and screen frames, and paint are requisitioned in vance by the superintendent hence are delivered to the job o specified date. While equipm unit No. 2 is being moved from last job, members of the crew d their personal automobiles to the work and arrange for living quart he first two days are spent setting the two compressors, laying the compressed air pipe line over bridge deck and building tents, alks and screens. In the pipe tees are installed every 20 ft. unions every 200 ft. to insure air ery at convenient intervals and k replacement of leaky or dam- d pipe.

uring this period the sandblast d and paint are stored, the com- sors are jacked up, leveled and on blocks to take their weight off pneumatic tires. Catwalks and ens are built on the job since it ot economical to haul this bulky ipment any great distance. On third day stagings are hung in top of the counterweight truss, sandblast chambers are moved to the bridge deck, sandblast es and air hoses for the opera- ' helmets are hauled up on the ing and actual work begins.

Allocation of the crew

Two operators are supplied by each d chamber, and a skilled laborer stationed at each chamber to regu- the flow of sand and air. Two orers supply the chambers with sand that has been hauled out the deck with a ½-ton truck. After hr. of sandblasting, this operation stopped, as the rule is for all steel be primecoated the same day it is aned. While the painters are greas- their hands and faces preparatory to painting, the steel is cleaned of dust and sand and the catwalks are moved into position.

On completion of the paint crew's work for the day, the paint pots are removed from the deck, catwalks are lowered and moved some 3 panels ahead for the sandblasting operations that will begin on the day following. This is necessary as the sand and dust otherwise would mar the previous day's paint. Two night watchmen guard equipment and stores, screen the recovered sand, clean out mixing boxes in the sand chambers, wash the spray guns and set out and take in warning lanterns.

When sandblasting and painting progresses to within 8 ft. of the deck, screens are placed between operators and traffic. These are moved along with the work to prevent interruptions by traffic.

Second and finish coats are applied after a 72-hr. interval following the prime and second coat application. The number of painters and time of painting is expanded as conditions require.

Before sandblasting below deck,

TABLE I—PROPORTIONS IN STEEL PAINT, FIRST AND SECOND COATS

	Red Lead Paste* (pounds)	Leafed Metallic Lead Paste (pounds)	Graphite (pounds)	Raw Linseed Oil (gallons)	Dryer (pints)	Mineral Spirits (pints)	Minimum Weight per gal. (pounds)
Special Primer Coat....	100	15	....	2	1	1½	27
Modified Second Coat....	100	42	43	8	7	3	17½

* Contains 7 percent linseed oil.

TABLE II—CONTENTS OF TWO DULL BLACK FINISH COATS IN PERCENTAGE BY WEIGHT

	Pigment			Vehicle					
	Total Pigment Percentage	Type B Graphite	Carbon Black	Total Vehicle Percentage	Raw Linseed Oil	Spar Varnish	Dryer	Turpentine	Minimum Weight per gal. (pounds)
3-B Graphite.....	45	95	5	55	75	10	5	10	10.5
		Type A Amorphous Graphite							
3-C Graphite.....	47	100	....	53	75	10	5	10	10.7

TABLE III—EQUIPMENT FOR MINOR STEEL STRUCTURE

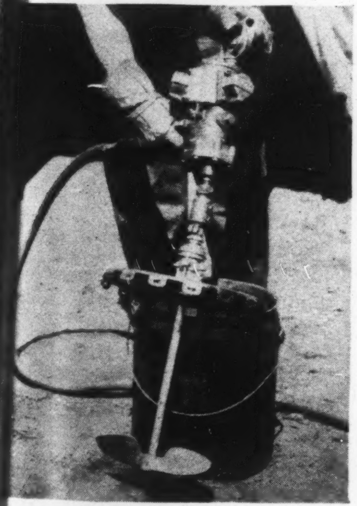
(Less than 20,000 square feet)

1	½-ton truck with express body
1	3-ton truck with built-in lockers and canopy
1	210-cu. ft. (actual) air compressor on 3-ton truck
1	1-ton two-wheel trailer
1	7½-cu. ft. sand chamber
2	50 to 75-ft. lengths of ¾-in. sandblast hose
3	Sandblast operators' helmets
1	Compressed-air purifier
1	¼-in. sandblast nozzle for each 5,000 sq. ft. of steel surface to be sandblasted (2 for two operators)
4	50-ft. lengths of ¾-in. oil-resistant air hose
3	10-gal. pressure paint tanks (six operators)
7	Spray-guns (1 extra for replacement)
12	Approved-type respirators
8	75-ft. lengths of ⅜-in. fluid paint hose
8	75-ft. lengths of $\frac{5}{16}$-in. air paint hose with ¼-in. standard pipe-thread connections
Miscel.	Also, 1-in. pipe for air as needed, staging suitable for the structure to be painted, miscellaneous small tools, rope falls, ladders, wrenches, scraping knives, paint brushes, etc.

TABLE IV—EQUIPMENT FOR MAJOR STEEL STRUCTURES

(More than 20,000 square feet)

1	½-ton truck with express body
2	315-cu. ft. (actual) air compressors
2	7½-cu. ft. sand chambers
4	50 to 75-ft. lengths of ¾-in. sandblast hose
5	Sandblast operators' helmets
2	Compressed-air purifiers
1	¼-in. sandblast nozzle for each 5,000-sq. ft. of steel surface to be sandblasted
4	50-ft. lengths of ¾-in. oil-resistant air hose
1	Air-driven power drill with drills
1	Riveting hammer
1	Rivet buster
2	50-ft. lengths of ½-in. oil-resistant air hose
1	Portable blacksmith forge with anvil and tools
1	Dehydrating outfit
3	10-gal. pressure paint tanks (six operators)
7	Spray-guns (1 spare)
12	Approved-type respirators
8	75-ft. lengths of ⅛-in. fluid paint hose
8	75-ft. lengths of $\frac{5}{16}$-in. air paint hose
Miscel.	Also, 2-in. pipe in 20-ft. lengths, with tees at each joint extending from set-up on shore to extreme end of bridge; staging suitable for the structure to be pointed; miscellaneous small tools, rope falls, ladders, wrenches, etc.



ig. 6. To agitate paint, the highway epartment shop mounted an air-drill echanism on a 6-in. propeller. Speed f rotation can be adjusted as desired.

where there may be areas that have had unusual protection, steel members are washed with a detergent followed by an application of clear water to show up any sound paint. Lacking steam, it is necessary to mix the detergent with water and apply through the sand chambers. The detergent ordinarily is composed of 47 percent sodium metasilicate, 40 percent sodium sesquisilicate, 10 percent sodium tetraphosphate and 3 percent nacconal. The detergent proved profitable because it disclosed considerable sound paint which had nearly been covered with grime and dirt. Thus replacement of the paint in these areas was unnecessary.

On this particular job, the paint crew put in a total of 60 working days. Cost per square foot of surface area for the various operations, including labor, materials, equipment and rental, as well as idle time in transportation, were as follows: sandblasting, 9.09c.; prime coat, 2.83c.; second coat, 2.32c.; finish coat, 2.83c.; total for these operations, 17.07c. Washing steel

Average unit costs of mat were: $4.60 per ton for san sand, $2.65 per gallon for red prime coat, $1.75 per gallon second coat graphite paint and per gallon for finish coat gr paint.

The paints gave a bright-steel erage per gallon as follows: coat, 370 sq. ft., second coat sq. ft., finish coat 450 sq. ft. of sand cleaned an average of sq. ft. of surface of bridge steel

Physical Examinations Pay Dividends

W. H. D. Hinchman

Resident Director
Esslinger-Misch Co., Construction Managers, Vigo Ordnance Plant

***Contents in Brief**—Pre-employment physical examination of prospective construction workers on a big ordnance plant in Indiana saved manpower by classifying employees according to physical qualifications, and helped first-aid and accident treatment because of available case histories.*

To SAVE MANPOWER in the present emergency, to utilize partly-handicapped workmen, to classify such workers so as not to aggravate existing infirmities, and to help first-aid and accident treatment, the managing constructors for the Vigo Ordnance Plant in Indiana, adopted a program of pre-employment physical examination of all prospective employees. From the first, a sanitation and safety manager was employed to further this effort. His function was to provide a sanitary working environment and to coordinate medical and first-aid facilities with the safety program. The pre-employment examination was adopted to determine the physical condition of the men and to assure their placement in a position commensurate with that condition. Also, the examination was intended to facilitate a more intelligent treatment of cases in the first-aid stations and hospital.

The sanitation and safety manager worked out, in conjunction with the personnel division, a pre-employment physical examination that was acceptable to all concerned with the construction of this project. The factors to be considered in determining the type of examination to be used were: (1) the quality of men available, (2) an examination sufficiently thorough to eliminate unnecessary insurance risks, (3) the reaction of organized labor, (4) personnel and facilities available.

Often in the past, pre-employment physical examination has been used to determine physical defects present at the time of hiring, in order that the employee would not be able to claim injury that had happened previous to his employment. Where a physical impairment would not interfere with his duties, the employee was done an injustice by the employer's refusal to hire him and thus take the responsibility of aggravating an existing condition that would make the employer liable and increase his insurance rate. With this thought in mind, our company wished to go farther with the pre-employment physical examination and place men upon jobs where existing physical impairment would not be aggravated. All men with hernias were hired and placed on work suitable to their condition.

In order to avoid possible difficulties, a meeting of all bus agents was held with the chie personnel and sanitation and manager present. At this time labor relation problems were cussed, the policy of the company set forth, and the pre-employ physical examination discussed. first, there was considerable anta ism on the part of the business ag but after a discussion of what intended and the presentation of safety factor involved, these readily agreed to the proposal. Of entire group, only one trade ref to submit to the examination, and number of its men was negligible

The physical examination admi tered consisted of: (1) a brief sonal history, (2) type of work man was to perform, (3) general pearance—healthy or otherwise, deformities noted, (5) check for cose veins, (6) hernia, (7) condi of applicant's spine, (8) conditio the heart, (9) pulse, (10) blood sure, (11) vision, (12) hearin whisper test, (13) check on the cinations for smallpox and typh and date of these innoculations. the conclusion of the examination doctor indicated that the man physically capable of doing the assigned or refused employment. percentage of refusals was less th percent of those examined.

physical examination was the ep in the processing of these r employment. If the man was d physically, no further proc- was necessary. If the man was d, a copy of his physical ex- ion form was checked for pos- remedial defects, and he was an interviewer in the depart- f sanitation and safety. This iscussed with the employee the le dangers from the existing ion and made recommendations rrection; for example, infected may cause (1) congestive dis- ces, (2) rheumatism, (3) arth- (4) possible heart ailment, (5) plete or improper digestion re- in headaches and a general wn feeling, (6) the develop- of gum disturbances, and (7) a nsanitary and unpleasant oral ion.

Personal hygiene discussed

sonal hygiene was discussed the individual as a part of the l war effort, and the applicant rged to correct the condition in to save lost man-hours, which, n, would not only help his coun- t would promote the well-being mself and family. This informa- was very acceptable to the aver- mployee, and the common re- e was that it would take two or pay days in order to be in a on to have these corrections

er the man was at work for 30 a card was mailed to determine ything had been done toward ction. A regular form card for type of impairment was sent to en who were interviewed at the of employment; for example, with defective teeth were asked, he time of your examination at igo Ordnance Plant it was rec- ended that you consult a dentist gard to your teeth. Please answer questions on the attached card return as soon as possible. Fail- o return this card will indicate nothing has been done." The re- card requested the following in- ation: "Did you consult a den- What treatment was recom- ded? What treatment was given? u did not see a dentist when do plan to have this work done?"

om July 1 to November 1, 1942, 7 employees were interviewed; 0 cards were mailed 30 days from date of employment. Of the cards returned signed by the employee, his doctor, dentist, or both, the following results were obtained: 252 had teeth cleaned or extracted, 71 obtained new dental plates, and 29 are having their gums treated, 60 secured glasses, 3 had eye operations, and 13 had minor eye corrections. There was one tonsillectomy, 5 had tonsils treated, 2 had ears treated, and one case of acne is being treated. There was a total of 447 corrections, 18 cases where treatment was not deemed necessary by the attending physician, 120 cases where plans had been made for future corrections, 37 reported they were financially unable at the present time to have corrections made, 10 reported nothing whatsoever done, and 6 errors were made in mailing the cards.

At the beginning of the job men with existing hernias were not refused employment; however, after the job was underway it was decided that each hernia case should have a properly-fitted truss in order to continue work. Although we had 231 employees showing partial or complete hernias, none were rejected for this reason. Of these, 154 were properly fitted with trusses, and 77 had left the job prior to the time of the decision to require trusses.

Followup found effective

In order to complete the followup of the cases interviewed, it was necessary to contact all persons who did not reply to our card questionnaire. This was accomplished by a 5-min. interview with the men on the job. This method materially increased the number of corrections. The following results were obtained from the 115 interviewed for the second time: 43 cases had teeth extracted, treated or cleaned, and 7 obtained new dental plates, 24 made appointments for dental work. There were 7 cases of eye corrections with 4 securing glasses and one having an eye operation.

A brief summary of the results of this followup work reveals: (1) that when men are aware of physical defects which may decrease their earning capacity, they will very gladly cooperate in having same corrected; (2) if the proper approach is used in the the interview, it will assist in obtaining a satisfactory percentage of corrections, (3) cards mailed to the employees serve as a reminder of the personal interview and is a good means of obtaining results from the first interview, (4) in the second interview results were obtained that were never reported by mail, and many future appointments and corrections were made as a result, (5) it is the opinion of the writer that the average workman is a typical American and will not take time out from regular duties for his own physical welfare unless constantly reminded of the dangers and sacrifices that his family and himself will have to endure as a result of the condition that may be avoided by a simple correction. From the standpoint of the employer, the writer believes that service of this kind to employees will go far toward building a better employer-employee relationship, thereby increasing the amount and quality of work produced, as well as being a factor of safety in the performance of same.

It is very difficult to estimate the accidents that might have been caused on this job due to the 323 cases of men with bad teeth which probably caused much pain and disagreeable feeling during working hours. This irritability naturally takes precedence over work being done. Because 80 to 90 percent of all accidents are due to carelessness, elimination of this distraction is a great factor in the safety program.

Favorable reactions

A study of the employees' reaction to the interview reveals that a large majority of the employees felt that the company was doing them a real favor. The many statements of the men received by the interviewers revealed their appreciation. It is also the opinion of the writer that this type of personal contact with employees, besides paying dividends from an economical standpoint, will go far toward solving many of the labor differences that might arise between the employer and employee.

In conclusion, the writer wishes to express his sincere appreciation to the sanitation and safety manager, Harry Ockerman, for the coordination of this fine activity in his program and for the tactful approach used by Mary Maple and Foster Coyle of the sanitation and safety department, who interviewed the employees during the progress of this work. The writer sincerely believes that this type of service is economically sound for the small contractor as well as larger companies.

From Field and Office

WORKING PROBLEMS AND TIME-SAVING METHODS FOR ENGINEERS AND CONTRAC

How to Find Length of Pipe To Make a Reverse Bend

In piping detailing practice, the draftsman frequently meets the problem of determining the length of pipe required to make a reverse bend. The known factor in the problem depends upon practical considerations. Four variables, which are shown as a, b, R, and α in the accompanying drawing, are involved and any three of these may be given. The following formula give a relation between these four factors, making it possible to solve for the unknown factor when three are given.

Referring to the diagram:

$$b = 2T + c \qquad (1)$$

$$T = R \tan\frac{\alpha}{2} \qquad (2)$$

$$c = a \cot \alpha \qquad (3)$$

$$\text{But } \cot \alpha = \frac{\cot^2\frac{\alpha}{2} - 1}{2\cot\frac{\alpha}{2}}\text{, therefore}$$

$$c = \frac{a\left(\cot^2\frac{\alpha}{2} - 1\right)}{2\cot\frac{\alpha}{2}} \qquad (4)$$

Formula 1 may now be written as:

$$b = 2R\tan\frac{\alpha}{2} + \frac{a\cot^2\frac{\alpha}{2} - a}{2\cot\frac{\alpha}{2}}$$

If this formula is multiplied by $2\cot\frac{\alpha}{2}$ and rearranged, it reduces to

$$a\cot^2\frac{\alpha}{2} - 2b\cot\frac{\alpha}{2} + (4R - a) = 0 \qquad (5)$$

This formula gives the relation between a, b, R and α.

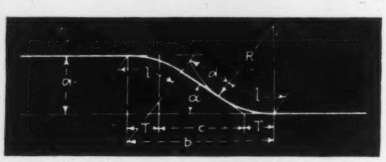
In order to solve for a, b, or R when the corresponding three other terms are known, all that need be done is to substitute to obtain a simple equation in one unknown.

For example: if the conditions of the problem are a equals 24, b is 48 in. and angle α equals 30 deg., by substituting in Formula 5 the relationship is

$$24\,(\cot^2 15) - 96\,(\cot 15) + 4R - 12 = 0,$$

from which R = 12.

Now, the length of the pipe may be obtained by means of standard formulas.



Nomenclature for use of formulas to find length of pipe in a reverse bend.

$$l = \frac{\pi R \alpha}{180} = \frac{\pi\,(12)\,30}{180} = 6.28 \text{ in.}$$

$$d = \frac{\sin \alpha}{a} - 2T =$$

$$\frac{24}{\sin 30} - 2\,(12)\,(\tan 15) = 41.57 \text{ in.}$$

Therefore, the total length of the pipe is

$$2\,(6.28) + 41.57 = 54.13 \text{ in.}$$

Supposing, however, that a, b, and R are fixed by conditions of the problem, then the method is to substitute in Equation 5 and solve an equation of the form $Ax^2 + Bx + C = 0$.

For example let $a = 24$ in.; $b = 48$ in., and $R = 12$ in.

Then $24\cot^2\frac{\alpha}{2} - 96\cot\frac{\alpha}{2} + 24 = 0$ and $\cot\frac{\alpha}{2} = \frac{96 \pm \sqrt{96^2 - 4\,(24)\,(24)}}{48} = 3.73$ or .87.

Since $\cot\frac{\alpha}{2} = 0.87$ is a spurious answer, as α cannot be greater than 90 deg. or $\frac{\alpha}{2}$ must be less than 45 deg., $\cot\frac{\alpha}{2}$ must equal 3.732, $\frac{\alpha}{2} = 15$ deg., and $\alpha = 30$ deg.

Proper use of Formula 5 will save the detailer and designer much valuable time in his work.—Samuel Levine, director, Manhattan Technical Institute, 55 W. 42nd St., New York City.

Air Jets Prevent Clogging

Piping compressed air into cement storage bins at the cement mill or on the construction job will prevent and ensure steady flow in the discharge spouts or chutes. This conclusion is based on observation by the writer of practice at the Union Portland Cement Co. Formerly the company employed electric bin vibrators or hammering with a sledge to keep t charge from raw or finished m bins free and uniform. Introd of a jet of compressed air in bins was found to perform th better and more cheaply. In the air to the bin the air cont should be conveniently located, often it takes only a very little do the work and jet regulation be made easy.

While it is true his obser has been limited to the aeration cement, states Verland T. Hen timekeeper, Union Portland Co., Devil's Slide, Utah, the compressed-air jets should pected to work as well to reduce ing and flushing in bins and h of any other fine materials.—*pressed Air Institute, New N. Y.*

Keeping Sprinkler Tank Riser From Freezing

A novel, yet practical, meth keeping an elevated water tank freezing in a cold climate has be service for over 15 years at Canyon, Ariz., where it was not ible to use electrical or steam-he methods.

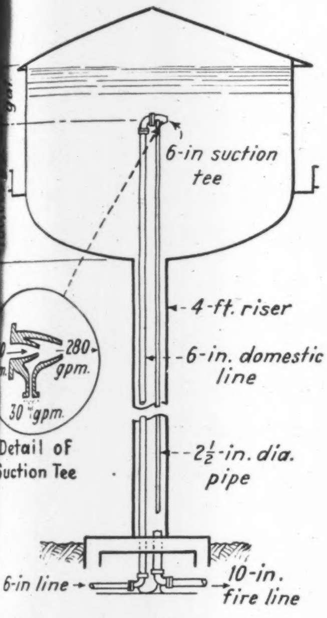
As reported in the January issue of *The Water Tower*, h organ published by the Chi Bridge & Iron Co., the problem solved by installing a piping arra ment, shown in the accompan sketch, to circulate the water in riser. Credit for the arrangeme given to the Atchison, Topek Santa Fe Railway, to whom the belongs.

The filling line, which also s as the domestic service line, is in diameter. It extends up thr the riser into the tank and has a son and McDaniel suction mounted at the top. A $2\frac{1}{2}$-in. extends from the suction tee to w a few feet from the bottom of riser.

The pumping rate through the inlet line is about 250 gpm.

city of the water in the tee, due he restricted orifice, develops a ion in the 2½-in. line of about pm. This draws water from the r part of the riser, causing a subtial circulation throughout its en- length.

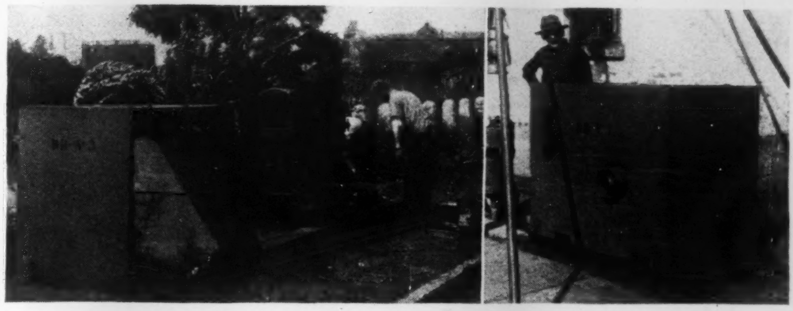
he effectiveness of this scheme is e out by the fact that this in- ation has gone through 15 win- without freezing, even though elevation of Grand Canyon is tively high and some very low peratures are encountered. It is rted that at one time a 2-in. kness of ice formed around the de of the riser but nevertheless the ulating system maintained a flow water through the center.



rculating system used in the riser pe of a water tank to prevent ezing difficulties.

cked Covers Used Protect Machines

Following damage to three gasoline gines due to meddling of small ys, the New York City Department f Public Works has made two-man, ck-on covers for its test boring rigs. s may be seen from the accompany- g photographs, the top and ends are one section, so that the cover does t have to be lifted more than a few ches to be set in place. The sides hang like storm sash. A bolt at the bottom of each end passes through holes in a pair of lugs welded to the skids of the drill rig; the bolt also passes through holes in lugs bolted to the bottom of each end of the cover, and through holes in the lower corner of each side. Each bolt is drawn just tight with a nut, and a padlock through a hole in the end of each bolt prevents removal of the nut.



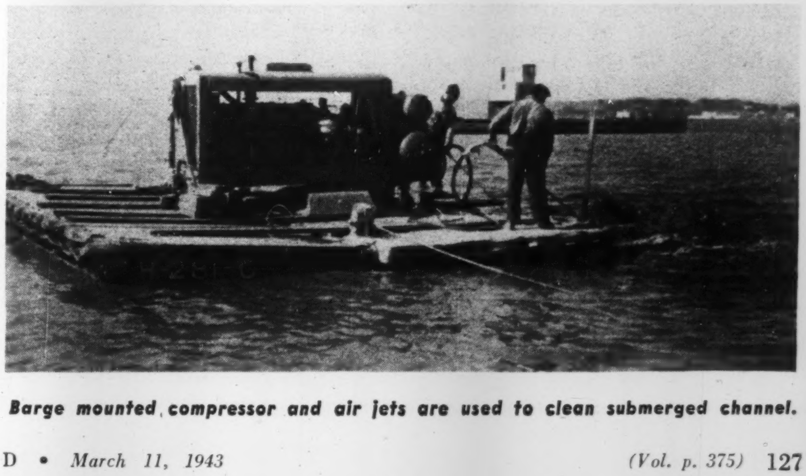
Engines and other equipment left unguarded on city streets at night may be protected by easily constructed covers.

The same type of cover might be used for other small contractor's equipment not provided with "boy-proof" coverings, and which must be left out on the streets at the present time, when watchmen are difficult to secure. The cover was designed and built to the writer's order under the direction of J. Frank Johnson, director of construction and operation, Williamsburg Bridge division of the public works department, of which Samuel Cooper, civil engineer, is in charge. The details were worked out by employees in charge of Joseph D'Amato, foreman carpenter.—H. D. HAMMOND, *civil engineer, Department of Public Works, New York City.*

Air Jets Clean Submerged Channel

Air jets are successfully used at Martinez, Calif., to open up a channel scoured in the soft bottom of the bay by the flow from a drainage ditch entering the bay. At times wave action fills the underwater channel with silt and sand so that free flow from the drainage ditch is obstructed. To remove the clogging material a 215-cfm. air compressor is mounted on a barge as shown by the accompanying illustration.

A hose attached to the compressor leads to two long ¾-in. pipe nozzles. The barge is towed along the line of the natural channel while workmen thrust the pipe nozzle down into the clogging silt and sand and they are sufficiently loosened by the air jets that the current washes them away. This information comes from C. L. Seaman, Cleveland Rock Drill Co., Berkeley, Calif.—*Compressed Air Institute, New York, N. Y.*



Barge mounted compressor and air jets are used to clean submerged channel.

Book Notes and Reviews

The month's addition to the engineer's reading and reference list

About Paints

National Paint Dictionary—Second Edition. By Jeffrey R. Stewart. 224 pp. Stewart Research Laboratory, 1340 New York Ave., Washington, D. C. $7.50.

So many new paint vehicles and pigments have come into commercial use in recent years as to make standard technical dictionaries largely out of date with respect to terms now fairly common in paint specifications. Hence the usefulness of a special dictionary of this kind for those who purchase or use paints. Only those trade names are included that relate to raw materials; no attempt has been made to include trade marked names of prepared paints. Also contained in the book is information useful to those mixing or applying paint.

Planning at New York

Traffic and Parking Study—A Plan for Improvement of Conditions in the Central Business Areas of New York City. 144 pp. Regional Plan Association, 400 Madison Ave., New York. $4.50.

New York Plans for the Future—By By Cleveland Rodgers. 293 pp. Harper & Bros., New York & London. $3.

Two notable studies of New York's municipal problems have been published since the year opened. One relates exclusively to the city's traffic and parking needs, the other also covers that subject in general terms but treats of it only as one of the many problems faced by the city's planning commission. Both books contain many general recommendations that will prove useful to the planning agency of any large city.

The "Traffic and Parking Study" of the Regional Plan Association was carried out under the direction of Harold M. Lewis with the objective of bringing together the scattered proposals of the many studies that have been made in the past so that definite proposals can be made, some of which have promise of being put into effect in the postwar period. The results of the study show that the traffic problem is largely one of administration. True, some construction is proposed, such as crosstown expressways, central bus terminals and parking garages, but these will not solve the traffic problem unless supported by strict enforcement of laws against unrestricted curb parking and misuse of the streets for loading purposes.

Cleveland Rodgers, former editor of the *Brooklyn Eagle*, in "New York Plans for the Future" appraises the city's future problems in the light of his experience as a member of the city's planning commission. Mr. Rodgers' background of newspaper work gives him a breadth of understanding of social and economic problems facing the city that is exceptional. This, coupled with ability to write well, makes his book well worth reading by anyone interested in the future of our large cities. Subjects covered in addition to the traffic problem are housing, land use, zoning, city government and the many economic questions that have an important bearing on sound city development.

✓ Work of the Army Engineers

The Army Engineers in Review—By Capt. Burr W. Leyson. 202 pp. E. P. Dutton & Co., New York. $2.50.

This well illustrated book was written for young men seeking information on the activities of the Corps of Engineers, U. S. Army. The writing answers its purpose in a satisfactory manner and can be recommended as good reading for the youth wanting to learn of the Army engineers in both peacetime and war. The book makes available an interesting history of the U. S. Engineers, and describes the river and harbor work of the Corps, its railroad and general construction operations, demolition, map making and camouflage. Also described is the organization of the engineer troops, the work of the Waterways Experiment Station at Vicksburg, Miss., and the Engineer School at Ft. Belvoir, Va.

Older engineers, especially those familiar only with the duties of the Corps of Engineers in peacetime, will find the book worthwhile reading despite the fact that the author in a style designed to meet the of younger readers.

Labor Relations

The Labor Relations Act in the —By Herbert O. Eby. 350 pp. Har Bros., New York. $3.50.

Contractors will find this ana of court decisions with respect National Labor Relations Act a ful book for determining their and those of their employees that act. Every important case has been decided by the courts the act was declared valid in 19 reviewed as to its general significa Also included is essential informa as to the background of these Laymen using the book will be he by the fact that the text is not dened with legal phraseology footnotes and a concise system references give the lawyer the i mation he needs to locate the text of the decisions that are cussed.

New Engineering Books

✓The Army Engineers in Review—By Burr W. Leyson. 202 pp. E. P. Dutt Co., New York. $2.50.

Foremanship and Safety—By C. M. Millan. 101 pp. John Wiley & Sons, New York. $1.

✓Air Conditioning Analysis—By Wil Goodman. 455 pp. The MacMillan New York. $6.

✓Engineering Mechanics—By Glen N. 301 pp. D. Van Nostrand Co., Inc., York. $3.

IV Congress Pan Americano De reteras—Published in three volu 2186 pp. Cuarto Congreso Panameri De Carreteras, Mexico City, Mexico.

Traffic and Parking Study—A plan Improvement of Conditions in the Cen Business Area of New York City. 14 Regional Plan Association, Inc. Madison Ave., New York. $4.50.

✓Photogrammetry—By H. O. Sharp. pp. John Wiley & Sons, New Y Chapman and Hall, London. $3.50.

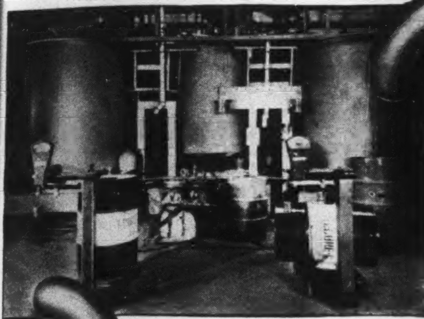
Plumbing Practice and Design—Volu By Svend Plum. 308 pp. John Wil Sons, New York; Chapman and London. $4.50.

(*Continued on p. 148*)

RITECURE

THE BETTER MEMBRANEOUS CONCRETE CURING MATERIAL

1
Strict Laboratory Control



2
Modern Manufacturing Facilities

3
Prompt Shipments in 50 Gallon Drums

4
Most Effective Coverage

No Weak Link in this Chain

RITECURE isn't a patent medicine thrown together in some dark corner by pseudo-chemists using "rule-of-thumb" methods and with no pretense of consistent proportioning.

No! RITECURE is a uniform product made up of certain standard ingredients in fixed proportions and manufactured under strict chemical and physical control. And, since it contains no strategic materials, it can be and is being produced in quantities ample enough to make large shipments promptly to any construction job.

RITECURE provides the greatest ratio of solids to the solvent—hence provides the greatest effective coverage. One gallon of RITECURE is sufficient for the curing of 30 to 40 square yards . . . *and it will cure it properly*. It retains curing water longest.

To paraphrase a certain well-known beer slogan—"Make yours RITECURE" — for BETTER CONCRETE

Send for this Bulletin

RITECURE
The
TRANSPARENT CURE

THE JOHNSON MARCH CORPORATION

RITECURE

A Transparent Membrane for Curing Concrete

IS SOLD BY:

THOMPSON MATERIALS CORP.
204 WEST STREET, NEW YORK, N.Y.

CURING MATERIALS CO.
2130 JANE STREET, PITTSBURGH, PA.

a product of: **The Johnson-March Corporation, 52 Vanderbilt Avenue, New York, N. Y.**

S-JM-7

MATERIALS AND LABOR PRICES

Market quotations on construction materials and wage rates reported monthly by ENR correspondents

PAVING asphalt price changes resulting from revised ceiling schedules set by the OPA provided the most important price movement in the construction material list in March. Chicago paving asphalt tank car price is 80c. per ton lower, but increases are reported in Dallas, Los Angeles, New York and Philadelphia.

Reinforcing bar price climbed 35c. per 100-lb. in St. Louis for the only iron and steel products change, and reinforced concrete sewer pipe is higher there. Vitrified sewer pipe is lower on all *ENR* quoted sizes in New York.

Southern pine lumber is down $2.25 to $10.00 in Philadelphia, and Doug fir which formerly ranged from $65 to $69, is now quoted at $65 per M Pine is 50c. to $1.00 higher on all sizes in St. Louis. Lime is up in Phila phia.

Skilled construction labor rates are unchanged from the preceding mo Common labor hourly average rate increased from $0.832 in February $0.842 in March as a result of the higher Kansas City rate for heavy struction labor.

CEMENT, AGGREGATES, READY-MIXED CONCRETE—F.O.B. CITY

	PORTLAND CEMENT Per bbl., carload lots, including 40c per bbl. for bags, cash discount not deducted: Cloth Bags *a*	Paper Bags	Bulk	SAND AND GRAVEL Per ton, carload lots: Gravel, 1½ in.	Gravel, ¾ in.	Sand	CRUSHED STONE Per ton, carload lots: 1½ in.	¾ in.	CRUSHED SLAG Per ton, carload lots, f.o.b. plant: 1½ in.	¾ in.	CONCRE Ready Mi 1:2:4, 50 c.y. more, deli
Atlanta	$2.77	$2.52	$2.47	$1.79	$1.89	$1.99	$1.79	$1.89	$1.59	$1.69	$8.00
Baltimore	2.33	2.08	1.88	1.75‡	1.75‡	1.25‡	1.75‡	1.75‡	1.75‡	1.75‡	7.25
Birmingham	2.50	2.25	2.10	1.75	1.75	1.50	.85	1.00	.90	1.15	5.80
Boston	2.75*b*	2.40*b*	2.30	1.40‡	1.40‡	1.00‡	1.40‡	1.40‡	....	....	7.25*m*
Chicago	2.70	2.45	2.30	2.15‡*d*	2.15‡*d*	2.15‡*d*	2.15‡*d*	2.15‡*d*	1.75‡	1.75‡	....
Cincinnati	2.31	2.06	1.81	1.20	1.20	1.10	1.80	1.80	....	....	6.60
Cleveland	2.40	2.15	....	1.70*i*	1.70*i*	1.60*i*	1.70*i*	1.70*i*	1.75*i*	1.75*i*	7.30*k*
Dallas	2.52	2.27	2.07	1.50*p*	1.70*p*	1.10*p*	1.69*p*	1.79*p*	....	....	6.20
Denver	3.08	2.88	2.68	1.20	1.40	1.25	1.65	1.75	1.00	1.00	7.25
Detroit	2.40	2.15	2.00	1.40	1.40	1.20	1.63	2.00	2.20‡	2.45‡	6.50
Kansas City	2.58	2.33	2.18	1.85	2.30	1.00	1.91	1.91	....	....	7.50*k*
Los Angeles	2.80*v*	2.20*v*	....	1.30	1.30	1.15	1.30*f*	1.30*f*	....	....	7.25
Minneapolis	2.90	2.65	....	1.00*h*	1.00*h*	.25*h*	1.00*h*	1.00*h*	....	....	7.60*j*
Montreal	....	1.95*rs*	1.79*rs*	....	....	1.30‡*t*	1.20‡*ct*	1.30‡*ct*	....	....	7.90*k*
New Orleans	2.41	2.16	1.96	1.65	1.65	.90	....	....	....	....	9.25
New York	2.66‡	2.41‡	....	1.60*de*	1.60*de*	.90*de*	1.70*de*	1.80*de*	....	....	7.25*k*
Philadelphia	2.33	2.08	1.88	1.55‡	1.65‡	1.20‡	1.90	1.95	1.10	1.10	8.20
Pittsburgh	2.44	2.19	1.99	1.40‡	1.40‡	1.70‡	2.25‡	2.25‡	1.50	1.50	8.25
St. Louis	2.80	2.52	....	1.75‡	1.50‡	1.25/1.50‡	1.10*h*	1.10*h*	.75*gw*	.75*gw*	8.00
San Francisco	....*u*	2.22	1.92	1.36	1.36	1.36	1.46	1.46	....	....	7.55
Seattle	2.95*o*	2.75*o*	....	1.00*o*	1.00*o*	1.00*o*	2.00*o*	2.00*o*	....	....	7.25

‡ Delivered. *a* 10c. allowed for each returnable bag. *b* 10c. per bbl. off for cash. *c* Plus municipal tax. *d* Per cu. yd. *e* Barge lots alongside docks. *f* Crushed granite. *g* F.o.b. Granite City, Ill. *h* F.o.b. plant. *i* Within three miles of Public Square. *j* 5% discount for cash. *k* Discount of 25c per. c. y. for cash in 10 days. *l* Up to 200 cu. yd. *m* 50c. off for cash *n* 25 c.y. or *o* 2% off for cash. *p* 10c. per ton off, cash 15 days. *r* 10c. per bbl. off, cas days. *s* 8% sales tax included. *t* 8% sales tax not included. *u*. Price drawn. *v* 20c. per bbl. discount; 20c. allowed for returnable cloth bag. *w* No m

CASH DISCOUNTS CEMENT to Contractors: truck delivery, 2% for cash on 10th of month; on carload deliveries, no trucking, same as dealer cash disco 10c. per bbl. for payment within 15 days of date of invoice. Subject discount 10c. per bbl. 20 days in Montreal.

CURRENT MAXIMUM PRICES RECEIVED AT CEMENT MILL

Charge for bags not included. For cloth bags, add 40c. per bbl.; 10c. refund allowed for each returnable bag; for paper bags add 15c. per bbl., not refunda

	Bagged	Bulk		Bagged	Bulk		Bagged
Buffington, Ind	$1.70	$1.65	Ironton, Ohio	$1.60	$1.55	Richard City, Tenn	$1.80
Dallas, Tex. (Inc. 10c. tax)	1.85	1.80	Limedale, Ind	1.70	1.65	Steelton, Minn	1.80
Hannibal, Mo	1.70	1.65	Norfolk, Va	1.75	1.70	Universal, Pa	1.65
Hudson, N. Y	1.75	1.70	Northampton, Pa	1.55	1.50	Waco, Tex. (Plus 10c. tax in Tex.)	1.75
Independence, Kans	1.70	1.65	North Birmingham, Ala	1.70	1.65	Montreal (8% sales tax incl.)	1.68

PAVING BRICK, BLOCKS, ASPHALT, ROAD OILS—F.O.B. CITY

	PAVING BRICKS AND BLOCKS: Granite per M. lots of 50,000 4x4x8 in.	Brick per M. 3x4x8½ in. carload lots	Wood per sq. yd. 3½ n. 16-lb. treat	PAVING ASPHALT Per ton, less than 80 penetration: Tank car	Drums	ASPHALT BINDERS—FLUXES Per gal., 80–300 penetration: Tank car	Drums	CUTBACK ASPHALT Per ton: Tank car	Drums	ROAD OILS Per gal. Tank car	ASPHALT EMULSION (Quick-breaking) Per gal.: Tank car	Drum
Atlanta	$73.00	$39.35	$2.25	$18.40*e*	$24.62*e*	$0.0787*e*	$0.1309*e*	$0.0876*he*	$0.1348*h*	$0.0676*e*	$0.0826	$0.138
Baltimore	150.00‡	48.00‡	80.00*m*	15.00*r*	21.00*r*	.06*r*	.09*r*	13.00*r*	23.00*r*	.065*r*	.07*r*	.14*r*
Birmingham	......	32.00*j*	....	17.95	.....†	.0747	......†	.0834*h*	......†	.065	.09	....
Boston	85.00	55.00	3.75	14.20	20.00	.06	.09	.065*h*	.115*h*	.065	.09‡	.12
Chicago	150.00	55.00	1.80/2.00*d*	14.00	20.70	13.00*g*	18.50*g*	.0575*h*	.15*h*	.05*n*	.09/.10	.13/.15
Cincinnati	112.00	37.50	....	16.40	.....	.085	......	12.25	......	.07	.085	....
Cleveland	118.00	37.50	2.25	19.00	20.00	.09	.105	.10*h*	.15	.08	.085	.09
Dallas	......	36.00	....	13.65	20.30	.06	.11	16.00	24.80	.06	.05/.07	.07/.0
Denver	......	27.50	....	.....	.....	......	......	......	......	......	......	....
Detroit	......	37.50	....	15.10*f*	22.60*f*	.0725	.1262	15.10	21.10	.067	.0725	.12
Kansas City	......	40.00	....	18.50	23.50	.077	.1075	.077*h*	.107*h*	.057	.11	.15
Los Angeles	......	50.00	....	9.00*b*	23.00	9.50*bg*	24.00*bg*	9.50*b*	......	.025	.072	.15
Minneapolis	......	.....	2.30*d*	.....	27.70	......	.126	......	32.64	......	......	....
Montreal	......	.....	....	16.60*k*	24.25*k*	.116*k*	.1485*k*	.115*hk*	.135*hk*	.08*k*	.135*k*	.18
New Orleans	......	.....	....	13.00*a*	19.00*a*	.055	.085	.06*h*	.09*h*	......	.078	....
New York	......	70.00	....	17.40	24.20*p*	14.00	......	.0725*h*	.1325*hp*	......	.0725*p*	.12
Philadelphia	130.00	58.00	4.06	15.00	.....	14.00	......	.065*h*	.....	......	14.00*g*	....
Pittsburgh	135.00	38.75	....	.....	.....	......	......	......	......	......	......	....
St. Louis	......	37.00	....	15.00*n*	21.00*n*	14.00*gn*	20.00*gn*	.065*hn*	.11*hn*	.05*n*	.09*n*	.812
San Francisco	......	70.00	....	9.50	18.00	9.50*gr*	18.00*gr*	10.00	17.50*r*	9.50*g*	.0525	.112
Seattle	......	60.00*c*	....	9.50*i*	18.00*i*	....	19.00*gi*	10.00*i*	......	9.50*i*	.0525*i*	.062

‡ Delivered. *a* F.o.b. Baton Rouge. *b* Delivered to purchaser's warehouse. *c* 3½x4x8½ in *d* 2½ in. 12-lb. treatment. *e* Local reduction due to 20% reduction intra-state class freight rates, only Georgia affected. *f* Mexican. *g* Per ton. *h* Per gallon. *i* F.o.b. Martinez. *j* 3x3½x8½ in. *k* Tax included. *m* Per th and. † Available on priority only and quoted specially. *n* September 1942 pr none later available. *p* No steel drum shipments except to armed forces. *r* February, 1943 prices, none later available

IRON AND STEEL PRODUCTS—BASE MILL PRICES

	STRUCT. SHAPES-PLATE	REINF. BARS ¾-in. billet *b*	RIVETS ¾-in. structural	WIRE NAILS Base *d*	SHEET PILING Base	STEEL RAILS Per Gross Ton Standard	Light	Re-rolled	TRACK SUPPLIES Angle Bars	Std. Spikes *c*	Tie Plates *c*	Track Bolts
gham	$2.10	$2.15	$3.75	$2.55	.....	$40.00	$40.00	$39.00	$2.70	$3.00	$2.15	$4.75
go	2.10	2.15	3.75	2.55	$2.40	40.00	40.00	39.00	2.70	3.00	2.15	4.75
urgh	2.10	2.15	3.75	2.55	2.40	40.00	40.00	39.00	2.70	3.00	2.15	4.75
o	2.10	2.15	.....	.....	2.40	.....	.....	.....	.....	.....	2.15	.....
and	2.10	2.15	3.75	2.55	.....	.....	.....	.....	.....	.....	.....	.....
stown	.....	2.15	.....	.....	.....	.....	.....	.....	.....	3.00	.....	.....
t	.....	2.27‡	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
ports	2.47*a*	2.52*a*	.....	.....	2.85*a*	.....	.....	.....	.....	.....	.....	.....
ports	2.75*a*	2.80*a*	.....	.....	2.95*a*	.....	.....	.....	.....	.....	2.30	.....

livered. *a* F.o.b. cars dock. *b* Rail steel same as billet prices. *c* Other points include Portsmouth, O., Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., and Pacific coast ports, on tie plates, alone, Steelton, Pa., on spikes alone, Lebanon, Pa., Richmond, Va. *d* Add switching charge $18 per c.l.

IRON AND STEEL PRODUCTS—F.O.B. WAREHOUSE, PER 100 LB., BASE PRICE

	STRUCTURAL SHAPES Per 100 lb. base price	REINFORCING BARS* Per 100 lb., ¾ in., base price 15 tons or over *b* New billet	Rail steel	Add Switch	$/cwt. for Del.	EXPANDED METAL LATH Per 100 sq.yd., carload lots Std. diamond mesh, 3.4 lb.	Std. ribbed 3.4 lb.	WELDED FABRIC REINFORCING Per 100 s.f., carload lots 4x16 in., No. 5 & 10 wires	4x12 in., No. 8 & 12 wires	6x6 in. No. 6 & 6 wires Per sq. yd.	SHEET PILING Per 100 lb. base price
ta	$2.34	$2.39	$2.39	$.02½	$.10	$21.06	$23.00	$1.82	$1.35	$0.1719	$3.04
more	3.70	2.90	2.75	......	.10	22.50	24.50	1.70	1.27	.1611	3.00
ingham	2.10*a*	2.15	2.15	.02½	.10	19.00	21.00	1.80	1.34	.1701	....
on	3.85	3.51	3.36	$20 C.L.	.10	18.50	29.50	1.76	1.31	.1656	2.70
go	2.10*a*	2.15	2.15	.03	.05	21.50	23.50	1.67	1.25	.1575	2.40
nnati	3.68	2.53*cd*	2.53*cd*	......	.05	19.50	21.50	1.66	1.25	.1566	....
land	2.10*a*	2.15	2.15	.02½	.10	19.50	21.50	1.66	1.25	.1566	....
s	4.25	3.17	3.17	......	.....	25.00	27.50	1.93	1.42	.1827	....
er	4.35	3.95	3.85	......	.....	26.50	28.50	1.97	1.45	.186	....
it	3.65‡	2.52‡	2.52‡	......	.10	25.00	28.00	1.68	1.26	.1584	2.66
s City	4.00	2.64*cd*	2.64*cd*	.0	.05	19.60	23.60	1.78	1.33	.1683	2.89
Angeles	3.65*f*	2.575	2.425	.02½	.05	23.00	27.50	1.93	1.42	.1827	3.65
eapolis	3.80‡	2.75	2.75	.0	.10	25.00	27.00	1.80	1.34	.1701	2.75*d*
treal	4.00*i*	2.90*i*	2.80*i*	......	.....	26.00*hij*	33.00*hij*	2.56*i*	3.14*i*	.268*i*	....
Orleans	4.40	2.52	2.52	.05	.10	21.50	23.50	1.82	1.35	.1715	2.875
York	3.75	2.76*c*	2.76*c*	......	.15	17.50	19.50	1.76	1.32	.1665	2.74
delphia	3.65	3.85	....	......	.....	19.50	21.50	1.71	1.28	.1611	2.74
burgh	2.10*a*	2.15	2.15	.02½	.10	23.00	26.50	1.59	1.20	.1503	2.40
Louis	3.69	2.7575	2.7575	.0	.05	28.00	34.00	1.69	1.27	.1602	2.70
Francisco	4.35	2.825	.....	.02½	.10	21.00	24.50	1.93	1.42	.1827	3.85
le	2.75*e*	2.50*e*	.....	......	.....	34.50	38.50	1.93	1.42	.1827	2.95*ej*.

‡ Delivered. *a* Mill prices. *b* 5–15 tons, add 15c. 1–5 tons, add 25c. Less than 1 ton, add 50c. *c* 20 tons or over Base. *d* Mill price plus freight. *e* F.o.b. . *f* Includes delivery in free delivery zone. *g* Less than 1 ton, add 25c.; 1 to 5 tons, add 10c. * High scrap steel prices cut former 15c. differences between new and rail steel in many mills. *h* List price. *i* Plus Dominion and Province sales tax. *j* August 1942 price; not on market.

PLUMBING, HEATING, WATER, SEWER AND DRAIN PIPE

	C. I. PIPE Per net ton f.o.b. 6 in. to 24 in.*a*	VITRIFIED SEWER PIPE Per foot, std. 8 in., s.s.	delivered std. 12 in., s.s.	ASTM 24 in.,	C13–35 36 in.,	CLAY DRAIN TILE Per 1,000 ft., carload lots, f.o.b. 6 in.	8 in.	CONCRETE SEWER PIPE Per ft., delivered; ASTM 12 in.	C 14–35 24 in.	WROUGHT STEEL PIPE Full standard weight, *h* 1 to 3 in., Butt Weld Black %	Galv. %	3½ to 6 in.; Lap Weld Black %	Galv. %
nta	$49.66	$0.26*b*	$0.468*bc*	$1.8525	$4.68*c*	$85.00	$128.00	$0.45	$1.642	48.2	54.2	59.7	51.2
imore	53.00	.35	.60	2.65	7.25	160.00	200.00	.50	1.75	65.5	57.5	63.0	54.5
ningham	45.00	.275	.495	1.95	5.50	100.00	220.00	.50	1.70	62.2	54.2	59.7	51.2
ton	55.40	.26	.463	2.07	5.85	140.00	......	.60	....	....	....	....	....
ago	54.33	.35	.675	2.70	7.00	100.00‡	150.00‡	.45	1.85	66.0	55.0	64.5	53.0
innati	53.27	.231	.4455	1.80	5.125	105.00	170.00	.60	1.70	57.1	43.4	54.0	39.6
eland	54.75	.224	.432	1.80	5.125	81.00	125.00	.30	1.60	67.8	59.8	65.3	56.8
las	56.43	.31	.58	2.25	5.00	90.00	110.00	.46	1.57	59.9	51.9	57.3	48.3
ver	61.56	.29†	.52†	2.16†	....	130.00	240.00	.50	1.50	58.4	50.4	55.7	47.2
roit	54.75	.245	.4725	1.935	5.14	82.50	131.25	.35	1.50	57.7	44.0	54.8	40.6
sas City	55.73	.315	.39	2.20	5.86	140.00	260.00	.45	1.60	35.8	46.3	46.0	59.7
Angeles	68.40	.282†	.508†	2.034†	5.085†	115.50	192.50	1.00	2.00	59.6	51.6	57.0	48.6
neapolis	59.00	.275†	.495†	1.98†	5.14†	......	......	.90	2.10	64.0	53.0	60.5	49.0
ntreal	60.00	.85	1.50	5.25	8.50*e*	45.00*m*	64.00*m*	.48*m*†	1.92*m*†	....	....	....	....
Orleans	51.78	.26	.48	1.69	.....	150.00	220.00	.40	2.10	62.4	54.4	58.8	50.3
York	52.40	.364	.702	2.565	6.355	......	......	.60	1.40	64.7	53.7	62.2	50.7
adelphia	51.00	.28	.54	2.30	6.75	150.00	225.00	.45	1.75	56.4	42.6	53.3	38.9
sburgh	56.00	.245†	.4725†	1.845†	5.4325	97.80	154.20	.85*g*	2.00*g*	68.5*i*	57.5*i*	66.0*i*	54.5*i*
Louis	52.84	.28	.504	2.016	4.50	85.00	220.00	1.00*j*	2.15*k*	56.4	42.6	52.5	38.1
Francisco	68.40	.3625*d*	.6525*d*	2.61	6.52	115.50	192.50	.58	2.34	46.0	32.0	42.0	27.0
ttle	70.20	.375	.675	2.70	6.75	84.00	187.50	.51*f*	1.44*f*	....	....	....	....

Delivered. † F.o.b. *a* B. & S. class B and heavier, C/L lots, 200 tons and r Burlington, N.J. (base) $49.00. Based on existing freight rates; subject to change. Gas pipe and class A, $3 per ton additional, 4 in., $3 per ton itional, 30 in. and larger usually $2 per ton less. *b* Double strength. *c* List dealer. *d* List. *e* 30-inch. *f* Less 5% for cash. *g* Culvert pipe. *h* Discounts from standard list consumers carload prices, except Pittsburgh prices f.o.b. mill. Base price $200 per net ton. List prices per ft.: ½ in., 8½c.; ., 11½c.; 1 in., 17c.; 2 in., 37c.; 2½ in., 58½c.; 3 in., 76½c.; 4 in., $1.09; 6 in., $1.92.

i Applies also at Lorain, Ohio, mills. Chicago delivered base is 2½ points less on butt, 1½ on lap. Freight is figured from Pittsburgh, Lorain, O., Chicago Dist. Billing is from point producing lowest price at destination. WROUGHT IRON PIPE: Base price and list prices per ft. same as wrought steel pipe. Discount for Pittsburgh base: Butt-weld—1 in. and 1¼ in. black 34, galv. 16; 1½ in. black 38, galv. 18½; 2 in. black 37½, galv. 18. Lapweld—2½ in. to 3½ in. black 31½, galv, 14½; 4½ in. to 8 in. black, 32½ galv. 17. *j* Reinforced; scpe C 76–37. *k* Reinforced; spec. C 75–37. *l* Plus sales tax. *m* Tax included.

LUMBER, TIMBER PLYWOOD—PER M FT., B.M., CARLOAD LOTS F.O.B.

	SHORT LEAF YELLOW PINE AND DOUGLAS FIR All S. L. Y. P. is No. 2 common or better and for No. 1 N. C. Box. (Prices in Bold Face) *All Fir planks No. 2 common, Fir timber is No. 1 common. Lengths up to 20 ft. (Prices in italics)*									LONG LEAF Y. P. Merchantable grade up to 20 ft.		PLYWOOD Rail freight incre (See note for base p	
	1x6 S4S	1x8 S4S	2x4 S4S	2x6 S4S	2x8 S4S	2x10 S4S	3x12 Rgh	6x12 Rgh	12x12 Rgh	2x12 Rgh	12x12 Rgh	⅝"	¼"
Atlanta	**$32.00**	**$32.00**	**$29.00**	**$28.00**	**$28.00**	**$31.50**	**$46.00**	......	......	$54.00	$62.00	$17.90	$21.8
Baltimore	**40.00**	**42.00**	**40.00**	**40.00**	**41.00**	**44.00**	**60.00**	......	......	110.00	115.00	18.25	22.2
	45.00	*46.00*	*52.00*	*52.00*	*52.00*	*52.00*	*68.00*	*$72.00*	*$72.00*	......	......	......	......
Birmingham	**34.50**	**36.50**	**32.00**	**32.00**	**34.00**	**34.00**	**53.00**	**53.00**	**56.00**	......	......	17.35	21.1
[1]	37.50	37.50	37.00	37.00	37.00	43.00	65.00	......	......	67.50	70.00	......	......
Boston ‡*	......	......	50.00[3]	55.00[3]	......	......	......	......	......	......	......	18.25	22.2
‡*	*45.00*	*45.00*	*50.00*	*55.00*	*60.00*	*70.00*	*75.00*	*80.00*	*80.00*	......	......	......	......
Chicago	**42.00**	**43.00**	**41.00**	**40.00**	**41.00**	**42.50**	**60.00**	......	......	80.00	95.00	14.60	17.8
	46.00	*46.00*	*47.50*	*47.00*	*47.00*	*48.00*	*57.00*	*56.50*	*58.00*	......	......	......	......
Cincinnati	**41.00**	**42.50**	**39.00**	**40.50**	**42.00**	**43.00**	**53.00**	......	......	65.00	68.00	17.35	21.1
	......	......	......	......	......	......	*55.50*	*55.50*	*55.50*	......	......	......	......
Cleveland	**42.50**	**42.50**	**41.50**	**43.50**	**45.00**	**47.00**	**53.00**	53.00	55.00	76.00	81.00	17.75	21.60
Dallas *e*	**39.50**	**40.50**	**39.50**	**38.00**	**38.50**	**39.50**	**53.00**	**53.50**	**53.00**	78.00	83.00	14.60	17.80
Denver ‡	54.00[4]	52.00[4]	55.00[4]	55.00[4]	55.00[4]	56.00[4]	59.00[4]	*73.00*	*79.00*	......	......	10.45	12.70
Detroit	**44.00**	**44.00**	**44.00**	**43.50**	**44.00**	**46.00**	**60.00**	......	......	53.00	63.00	17.35	21.15
	......	......	......	......	......	*51.50*	*55.00*	*60.00*	*60.00*	......	......	......	......
Kansas City	**50.00**	**55.00**	**52.00**	**52.00**	**52.00**	**55.00**	**65.00**	......	......	75.00	85.00	12.60	15.40
	50.00	*55.00*	*52.00*	*52.00*	*52.00*	*55.00*	*65.00*	*80.00*	*80.00*	......	......	......	......
Los Angeles *a*	*55.00*	*55.00*	*53.00*	*53.00*	*51.00*	*51.00*	*57.00*	*65.00*	*56.00*	......	......	9.90*gh*	12.05
Minneapolis ‡*b*	49.00[8]	49.00[8]	......	......	......	......	......	......	......	......	......	12.60	15.40
‡	*53.00*	*53.00*	*53.00*	*52.00*	*52.00*	*53.00*	*59.00*	*61.00*	*61.00*	......	......	......	......
Montreal †[7]	*43.00*	*46.00*	*42.00*	*45.00*	*47.00*	*54.00*	......	......	......	200.00	200.00	......	......
	42.50	*42.50*	*45.25*	*47.25*	*48.25*	*46.75*	*50.75*	*50.75*	*50.75*	......	......	......	......
New Orleans	**31.50**	**31.50**	**33.75**	**31.75**	**34.00**	**35.00**	**48.00**	......	......	69.00	69.00	14.60	17.80
	31.00	*31.00*	*33.00*	*31.00*	*34.00*	*32.00*	*33.00*	......	......	......	......	......	......
New York ‡	**50.00**	**51.00**	**51.00**	**50.00**	**51.00**	**54.00**	**62.00**	......	......	120.00*f*	125.00*f*	18.35	22.25
‡	......	......	*65.00i*	*65.00i*	*65.00i*	*65.00i*	[Range from $75 to $95]			......	......	......	......
Philadelphia	**50.75**	**50.75**	**51.75**	**50.00**	**50.00**	**52.75**	**70.00**	......	......	110.00	107.75	18.25	22.25
	......	......	*65.00*	*65.00*	*65.00*	*65.00*	*67.50*	*$75 to $95*	*$75 to $95*	......	......	......	......
Pittsburgh	**50.80**	**53.20**	**62.75**	**55.00**	**60.85**	**62.50**	**76.25**	......	......	......	......	18.10	22.05
	69.20	*68.10*	*66.10*	*65.30*	*65.20*	*65.65*	*88.75*	*88.75*	*88.75*	......	......	......	......
St. Louis ‡*c*	**51.00**	**51.00**	**49.00**	**48.00**	**49.00**	**52.00**	**66.00**	*72.00*	*72.00*	84.00	71.00	14.60	17.80
San Francisco *d*	*35.50*	*35.50*	*37.00*	*37.00*	*36.50*	*36.50*	*40.50*	*49.50*	*49.50*	......	......	7.30*g*	8.90
Seattle	*35.00*	*35.00*	*35.00*	*35.00*	*35.00*	*35.00*	*40.00*	*40.00*	*40.00*	......	......	0.00	0.00

Bold Face type, Southern Pine. *Italics, Douglas Fir.* [1] Long leaf. [2] Roofers' N. C. Pine. [3] Spruce. [4] Native. [6] Western Pine, No. 3 Common. [7] Spruce. [8] Norway Pine. ‡ Delivered. *a* Yard prices. *b* Contractors discount in Minneapolis and St. Paul discontinued May 21, 1938. *c* 5M ft. or less. *d* F.o.b. cars San Francisco freight rate. *e* 10% discount taken off. *f* Up to 18 ft. † Plus sales tax. * Prices for truck delivery; no longer quoting carload lots f. o. b. city.

NOTE: Special concrete form grade Fir Plywood, 4′ by 8′ panels, 5-ply, sand 2 sides, water resistant glue, carload lots, delivered per 1,000 sq. ft. surfa Seattle base price on ⅝", $86.50; on ¾", $95.30; price includes oiling and ing charges. For other centers add rail freight increment from table or p size. For resin dipped treatment, add $10.50 per M. *g* Lower rate by wa shipment. *h* 50,000 lb. minimum. *i* Ranges from $65 to $69.

GLASS, EXPLOSIVES, CHEMICALS

	WINDOW GLASS Discounts from jobbers list, Aug. 15, 1938 Single or Double Thickness A quality	B quality	EXPLOSIVES Per lb. 40% Ammonia Gelatin in 50-lb. cases delivered in 200 lb. lots*	
Atlanta	75%	75%	$0.15	
Baltimore	78%	79%	.15	Price of 60% Ammonia Gelatin in $0.01 per lb. higher than 40%
Birmingham	76%	76%	.105	
Boston	77%	78%	.15	
Chicago	77%	77%	.15	
Cincinnati	71–10%	71–10%	.15	
Cleveland	77-10%	77–10%	.19	
Dallas	76%	76%	.1625	
Denver	76%	76%	.155*e*	
Detroit	77%	77%	.1575	
Kansas City	76–10%	76–10%	.155	
Los Angeles	86%*d*	88%*d*	.1575	
Minneapolis	77%	77%	.155	
Montreal	40–5%‡	47%‡	.1675†	
New Orleans	70%	75%	.16	
New York	81%	82%	.22*f*	
Philadelphia	78%	79%	.15	
Pittsburgh	79%	79%	.1225	
St. Louis	76–10%	76–10%	.155	
San Francisco	66–15%	73–15%	.155	
Seattle	75%	75%	.1575†	

a Disc. from list Sept. 1939. *b* Also less 6% tax exemption. *d* Discount from jobbers' list Sept. 15, 1928. ‡ Plus sales tax.

* Urban prices influenced by service charges or local storage and delivery regulations, do not consistently reflect quantity prices in less congested areas, *e* F.o.b. Louviers, Colo. *f* In boroughs of Kings, Queens and Richmond, and in Manhattan south of Canal Street, add delivery charge of $6.00 per trip † F.o.b.

40% Ammonia Gelatin price ranges in other than urban areas, per lb.
(except Seismograph Grades)

	C/L 20,000 lb. net	Tons	200 lb. lots
E. of the Miss., except Fla. and Me.	$0.105	$0.13	$0.15
W. of Miss. to Rocky Mtn. States, Fla. and Maine.	.11 –.1175	.135 –.1475	.155 –.1675
Rocky Mtn. States	.11 –.1225	.135 –.1525‡	.155 –.1725‡
Pacific N. W. States	.1075–.12	.1375–.15	.1575–.17
Pacific S. W. States	.1050–.1125	.135 –.1425	.155 –.1625

‡ F.o.b. Louviers, Colo., or Butte, Mont.

PILES, TIES—F.O.B.

PILES

Prices per linear foot, pine, with bark on, f.o.b. New York; delivered fro barge 1½ to 2c. per ft. additional:

Dimensions	Points	Length	—Short Leaf— Barge	Rail
12 in. at butt	6 in.	30 to 50 ft.	$0.23	$0.26
12 in.— 2 ft. from butt	6 in.	50 to 59 ft.	.26	.28
12 in.— 2 ft. from butt	6 in.	60 to 69 ft.	.31	.33
14 in.— 2 ft. from butt	6 in.	50 to 69 ft.	.28	.33
14 in.— 2 ft. from butt	6 in.	70 to 79 ft.	.31	.37
14 in.— 2 ft. from butt	5 in.	80 to 85 ft.	.40	.48
14 in.— 2 ft. from butt	5 in.	85 to 89 ft.	.45	.53

RAILWAY TIES

Prices f.o.b., per tie for carload lots:		6"x8"x8′ Untr.	Tr.	7"x9"x8′6" Untr.	Tr.
Boston	Oak	$1.50	....	$2.00	....
	Pine	2.00	$3.00*a*	3.00	$3.50*a*
New York	S. L. Sap Pine	1.43/1.54	2.59	1.76	2.86
	Mixed Oak	1.71	2.59	2.42	3.58
Birmingham	White Oak	1.00	1.60*a*	1.30	2.25*a*
	Southern Pine	....	....	....	....
Chicago	Red Oak	....	2.19*a*	....	2.87/3.0
	Southern Pine	....	....	....	....
Los Angeles	Douglas Fir	1.10	1.75*a*	1.60	2.50*a*
Philadelphia	Red Oak	....	2.10*ag*	....	3.25*ag*
St. Louis	White Oak	1.65*	....	1.90*	....
	Red Oak	1.55*	2.15*a**	1.90*	2.70*a**
	Sap Pine or Cypress	1.35*	....	1.70*	....
San Francisco	Douglas Fir	1.15*bef*	....	....	3.00*c*
Montreal	Birch or Maple	.85	.95	....†	....†

Tr.— Treated; Untr.— Untreated. *a* Creosoted. *b* 6" x 8 x 8′6". *c* Empt cell. *d* Zinc. *e* Green. *f* F. o. b. cars. † Out of market. * September 19 price, none later available. *g* January price, none later available.

CHEMICALS

Water, sewage treatment road work, f.o.b. carlots, New York

Bleaching powder, in drums, f.o.b. works, per 100-lb	$2.50– 3.1
Chlorine cylinders, liquid, per lb. delivered	.052
Calcium chloride, 77–80%, flaked, in 100-lb. paper bags, delivered, per ton	18.50–35.0
Silicate of soda, 52 deg., in drums, f.o.b. works. per 100 lb	1.4
Soda ash, 58%, in paper bags, per 100 lb. dense	1.1
Sulphate of aluminum, commercial. in 100-lb. bags, per ton	23.00–25.0
Sulphate of copper, in bbl., per 100-lb	5.15– 5.3

STRUCTURAL CLAY BUILDING TILE, BRICK AND LIME—DELIVERED

	STRUCTURAL CLAY TILE—PARTITION—SCORED Per M. lots of 2,000 pieces or over,			STRUCTURAL CLAY TILE—LOAD BEARING—SCORED Per M. lots of 2,000 pieces or over,			BRICK Per M. in quantity.		LIME		
	3x12x12 in.	4x12x12 in.	8x12x12 in.	8x12x12 in.	10x12x12 in.	12x12x12 in.	Common backing	Straight hard	Per ton, Hydrated finishing	In paper, Common hydrated	Carload lot, Pulverised or lump
	$104.00	$114.00	$199.00	$234.00	$244.00	$250.00	$13.50	$18.04	$26.54	$15.04	$15.04
re	84.00	90.00	170.00	200.00	260.00	320.00	15.00*k*	19.00*k*	18.00	13.00	2.50*m*
gham	80.00	85.00	160.00	191.00	252.00	288.00	14.50	17.00	18.11	13.64	2.25*lo*
	89.35*a*	93.30*a*	178.70*a*	202.50	271.80	308.20	16.50*i*	19.50*i*	17.50†	12.50†	14.92†
o	72.00	77.00	145.00	197.00	243.00	278.00	12.50	13.50	17.00	15.00	12.50
ati	65.55	69.90	131.20	148.70	210.35	240.45	17.50	17.50	15.50	13.00	.....
nd	60.00	64.00	120.00	144.00	193.00	221.00	17.00	17.00	15.75*j*	13.25*j*	3.00*jm*
	62.50	67.50	135.00	162.00	212.50	263.00	13.50*i*	15.00*i*	19.00	15.00	4.95n
	84.80	95.40	153.70	178.20	212.00	227.90	14.50	17.00	25.00*j*	17.00*j*	20.00*j*
	86.05	91.80	172.10	213.00	268.00	330.00*e*	17.50	18.00	18.00	16.00	16.00
City	67.00	69.00	89.00*c*	128.00	163.00	189.00	15.00	16.00	19.32	13.00	10.92
geles	73.50†*r*	89.50†*r*	128.00*c*†*r*	210.00†*r*	368.00†*r*	460.00†*r*	13.50	15.00	16.50	17.50	17.50
apolis	81.00*b*	86.40*b*	146.90*b*	......	177.00*b*	246.00*b*	13.60	15.60*g*	21.00	16.00	19.00
al	99.10*a*	105.65*a*	154.75*a*	104.65*at*	154.75*au*	155.25	22.00†*u*	27.25†*u*	24.60*u*	18.00*u*	.....
rleans	72.00	72.00	135.00	162.00	210.00	260.00	14.00	.....	18.30	12.08	14.10
ork	78.40	83.60	115.00*c*	193.30*h*	238.80*h*	295.60*h*	15.00	.....	20.00	14.00	17.00
elphia	90.00	97.70	183.20	197.10	243.20	301.10	17.00	20.00	15.75	9.00	11.50
rgh	62.35	66.55	124.75	140.25	173.25	198.00	17.50	19.50	17.90	15.40	2.55*m*
uis	67.00	95.00	130.00	190.00	244.00	290.00	18.00	17.00	22.00	18.00	24.00
ancisco	84.00	94.50	225.00	......	......	......	17.50	22.00	20.00	20.00	16.40
	115.00	125.00	230.00	......	......	......	20.00*f*	21.00*f*	20.00*s*	20.00*s*	20.00*s*

o.b. *a* Smooth. *b* Carload lots delivered to job. *c* 6x12x12 in. *d* Not earing. *e* 48 lb. tile. *f* Less $1.00, ½ cash 15 days, balance 30 days. ted common. *h* F.o.b. Perth Amboy, N. J. *i* F.o.b. Warehouse only. *j* LCL. *k* $1,00 discount if paid in 10 days. *l* Lump. *m* Per bbl., 180 lb. *n* Per sack 100 lb. *o* Per bbl., 200 lb. *p* 280 lb. bag. *r* 5% discount 10 days. *s* 2% discount for cash. *t* 5½x8x12. *u* 8% sales tax include d

PAINT, ROOFING—F.O.B. CARLOAD LOTS

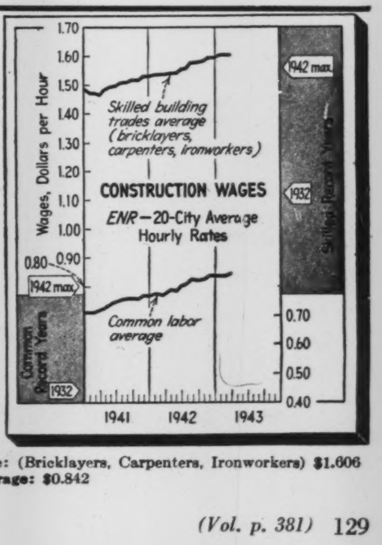
	RED LEAD Per 100 lb. in. 600-lb. (Approx.) bbl.	WHITE LEAD	READY-MIXED PAINT Per gal., drums			ROOFING SUPPLIES Carload lots f.o.b. factory				
	Dry *a*	Per 100 lb. in oil	Graphite *b*	Aluminum *b*	Ferric Oxide *d*	Rolls, slate surfaced, 85–90 lb. per sq.	Asphalt felt, per 100 lb.	Tar felt, per 100 lb.	Asphalt coating per gal.	Tar pitch 350 lb. bbl. per ton
ta	$10.25	$14.125	$1.30	$2.25	$1.20	$1.90	$1.61	$1.61	$0.27	$29.00
more	10.00	13.75	2.00	3.00	2.50	2.30	2.70	2.70	.40	29.00
ngham	10.25	14.125	2.35	3.50*r*	1.98*r*	2.04	1.97	1.97	.32	28.35
n	10.00	13.75	1.60	....	2.40	2.12‡	1.72*h*‡	1.72*h*‡	.50‡	20.00‡
ro	10.00	13.75	....	....	....	1.75*hf*	1.74*hf*	1.82*hf*	.33*f*	23.00*f*
nati	10.00	13.75	1.70	2.90	1.60	2.40	2.39*h*	2.39*h*	.36	21.00
land	10.00	13.75	2.10	4.80	1.95	1.93	1.83*h*	1.83*h*	.35	29.00
s	10.00	14.50	1.88	2.11*n*	.05*l*	1.75*h*	1.66*h*	1.66*h*	.35	39.00
er	10.50	14.25	1.65	....	.27*l*	2.45	3.15	3.15	.35	28.00
it	10.00	13.75	1.75	3.00	1.60	2.10	2.06	2.06	.35	23.00
s City	10.00	13.875	2.39*g*	2.55*gr*	2.16*gn*	2.10	2.30	2.30	.28	27.50
ngeles	10.25	14.25	1.60	2.25	2.30	2.10	1.50	....	.45	.....
eapolis	10.00	13.875	....	....	....	1.75*i*	1.66*hi*	1.66*hi*	.32	23.00
treal	9.25	6.25	2.85*p*	5.39*p*	2.70*p*	2.85	2.58	2.07	.63	1.85*k*
York	10.00	13.75	2.03	....*r*	1.64	1.66	1.58*h*	1.58*h*	.26	25.00
delphia	10.00	13.75	....	....	....	1.75	1.66	1.66	.32	23.00
burgh	10.00	13.75	1.05	1.95	.80	1.95	1.94*h*	1.94*h*	.34	26.00
ouis	10.00	13.75	2.28*s*	2.89*s*	1.96*s*	1.91	1.66	1.66	.28	22.00
Francisco	10.25	14.00	1.80	2.75*n*	1.35/2.35	1.71	2.40	2.40	.33	19.50
e	10.25	14.25	1.90	3.00	....	2.15	2.16*h*	....	.35	26.50*j*

Delivered. Note: Red lead in oil 50c. higher than white lead in oil. *a* Red prices change frequently due to pig lead price changes. *b* U. S. War Dept. 3-49A. *c* ASTM Spec. D266–31. *d* 80% minimum ferric oxide. ject to 25% discount. *f* Distributors' price to contractors. *g* 5 gal. can. *h* Per roll, 65 lb. *i* Minneapolis and vicinity. *j* Asphalt pitch. *k* Per 100-lb. *l* Per lb. *m* Per bbl. *n* May, 1941 price, no later quotation available. *p* Plus 8% sales tax. *r* Not available, except on priority rating; then quoted specially. *s* December price.

SKILLED AND COMMON WAGE RATES—PER HOUR

	Brick-layers	Car-penters	Struct. Iron Workers	Hoisting Engineers	Plas-terers	Common Labor Building	Common Labor Heavy Const.
ta	$1.50	$1.25	$1.375	$1.00/1.25	$1.50	$0.40	$0.50
more	1.75	1.375	1.80	1.625/1.80	1.50	.70	.70
ingham	1.75	1.125/1.25	1.50	1.25/1.50	1.50	.65	.65
n	1.625	1.50	1.65	1.875	1.667	.80/1.00	.80/1.00
go	1.75	1.70	1.76	1.75	1.825	1.10	1.10
nnati	1.75	1.50	1.625	1.40/1.55	1.625	.80	.80
eland	1.75	1.55	1.75	1.75	1.75	1.00	1.00
s	1.625	1.25	1.50	1.75	1.625	.60	75/1.25
er	1.65*b*	1.50*b*	1.625*b*	1.43*b*	1.51*b*	.80*b*	.80*b*
oit	1.675	1.50	1.75	1.625/1.75	1.675	.90	.90
as City	1.65	1.50	1.625	1.625	1.65	.90	.90
Angeles	1.50	1.50	1.50	1.50	1.667	.75	.75
eapolis	1.50	1.375	1.50	1.40	1.50*e*	.925	.925
Orle	1.50	1.25	1.50	1.50	1.375	.65	.65
	2.00*b*	1.85*b*	2.00	2.00*b*	2.00*b*	1.031	.95
a	1.90	1.50	1.90	2.00	2.00	.825	.825
burgh	1.90	1.50	1.75	1.625	1.75	.80	.70
ouis	1.75	1.50	1.75	2.00	1.75	.95	.95
Francisco	1.75	1.4375	1.75	1.50/1.75	1.75	.95	.95
le	1.715	1.415	1.615	1.565	1.715	1.015	1.10
treal	.965	.855	.90	.80	.945	.505	.505

7 hr. day. *e* 30 hr. wk.



ENR Skilled Average: (Bricklayers, Carpenters, Ironworkers) $1.606
ENR Common Average: $0.842

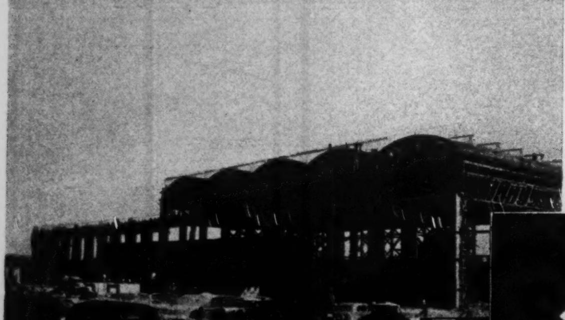
TRAVELING FORMS *fo*

...ANOTHER CORBETT

TRAVELING FORMS for large concrete buildings were originated by Corbetta during the quiet 30's! In those years when construction money was the critical consideration, successful bidding hinged upon the initiation of sound new ideas and lower cost methods!

Today, TRAVELING FORMS, now highly Corbetta-developed fit right into the wartime urgency. Their use is recording tremendous savings of lumber, formwork, manhours and money. These are vital economies! Together they demonstrate proof of this company's ability to get things done faster . . . with less!

A Corbetta-constructed, large industrial plant. Erected in the late 30's. It was here that Corbetta introduced Traveling Forms—with such success as to justify further application and development. Complete details upon request.



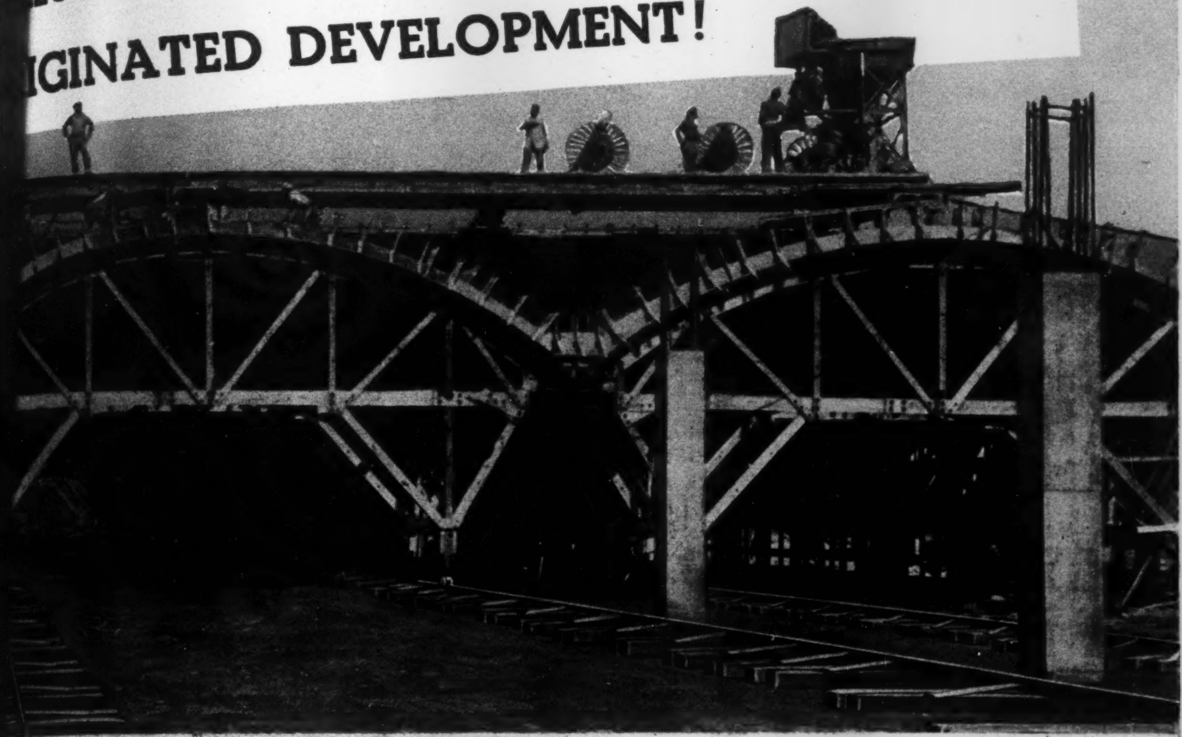
CORBE

FOUNDED UPON "GETTING TH

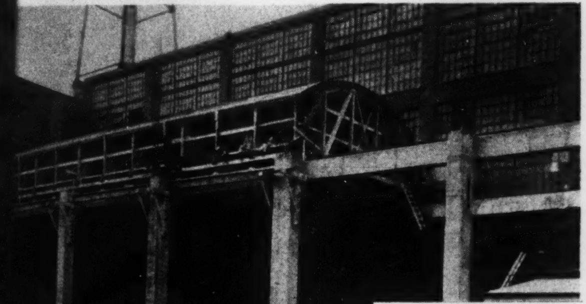
NEW YORK OKLAHOMA NEBRASKA WEST VIRGINI

S RGE CONCRETE BUILDINGS

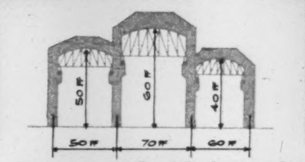
TT IGINATED DEVELOPMENT!



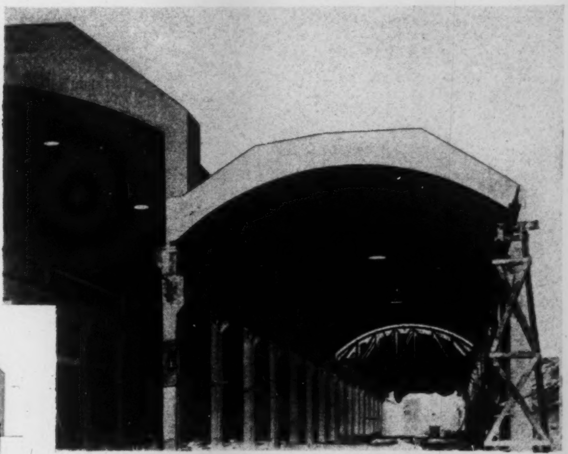
0. Actual Photo. Traveling Forms as Developed by Corbetta for Large Warehouse Construction. Note Headroom and Full-width Clear Passage



orm Travels on Permanent Overhead Rails



This is type of Roof Arches, each of different height and width as shown in part in photos above



Here, Traveling Form has advanced Construction of Roof

ONSTRUCTION COMPANY, INC.

CUTIVE OFFICE: 220 EAST 42nd STREET, NEW YORK, N. Y.

NNSYLVANIA OHIO MARYLAND DELAWARE NEW JERSEY

CONTRACT UNIT PRICES

What contractors are bidding on different kinds of construction work

GRADE CROSSING ELIMINATION FRANKLIN COUNTY, OHIO

OWNER: State of Ohio, Dept. of Highways, Columbus, Ohio.

PROJECT: Grade crossing elimination project in Franklin County, Ohio—overall length 2.243 miles, including roadways and approaches. Involves construction of 394-ft. reinforced concrete and steel bridge over Baltimore & Ohio, Pennsylvania, and New York Central Railroad tracks; 77-ft. bridge (rigid frame structure) over Fifth Avenue; roadway culverts; 8-in. portland cement concrete pavement; excavation; drainage structures; roadside improvement; and appurtenant work. Pavement width varies, 26-ft., 24-ft., and 18-ft.

CONDITIONS: Contractor to furnish all materials and complete work by December 31, 1943. Rail and highway transportation facilities available. Wage rates are: skilled labor, $1.15 to $1.75 per hr.; semi-skilled, 75c to $1.375; and common, 75c.

BIDS: Four bids were received December 22, 1942, ranging from the contract low of $540,000 to $643,649. Engineer's estimate, $656,220.

LIST OF BIDDERS:

1. Visintine & Co., Columbus, Ohio (contract)	$540,000
2. Skilken Brothers, Columbus, Ohio	621,002
3. John Hill, Mansfield, Ohio	638,904
4. National Engineering & Contracting Co., Cleveland, Ohio	643,649

Roadway

Item	Quan.	Unit Prices (1)	(2)	(3)
1. Unclassified roadway excavation	21,188 c. y.	$0.75	$1.01	$0.65
2. Borrow (contractor to furnish)	156,059 c. y.	.60	.82	.95
3. Remove and dispose exist. conc. pavmt	36 s. y.	.50	1.25	1.00
4. Remove, dispose of exist. bitum. pavmt	1,352 s. y.	.20	.78	.25
5. Remove, dispose of exist. wearing crse	664 s. y.	.20	.70	.25
6. Remove trees and stumps	70 ea.	10.00	18.90	25.00
7. Cut and seal exist. pavmt. edge	2,818 l. f.	.10	.37	.25
8. Seal existing pavement edge	2,054 l. f.	.07	.09	.05
9. Water (estimated)	751 M gal.	2.00	3.27	7.00
10. 12-in. plain cem. conc. pipe (driveways)	170 l. f.	1.50	1.64	2.75
11. 10-in. p. c. c. pipe (storm sewers under pavmt.)	76 l. f.	1.20	1.76	2.40
12. 24-in., as above	80 l. f.	4.00	5.04	6.00
13. 24-in. p. c. c. pipe (for storm sewers)	468 l. f.	4.00	5.04	5.50
14. 15-in., as above	391 l. f.	1.80	2.15	3.15
15. 12-in., as above	1,580 l. f.	1.50	1.64	2.50
16. 6-in. p. c. c. pipe (storm sew. under pavmt.)	32 l. f.	1.15	1.25	1.50
17. 8-in., as above	96 l. f.	1.25	1.52	2.25
18. 12-in., as above	1,256 l. f.	1.50	1.89	3.00
19. 15-in., as above	130 l. f.	1.80	2.14	1.40
20. 18-in., as above	144 l. f.	2.50	2.90	4.50
21. 21-in., as above	176 l. f.	3.00	3.40	5.25
22. 12-in. ext. qual. drain tile (roadway drainage with porous backfill)	570 l. f.	1.60	1.33	2.60
23. 21-in. pl. cem. conc. pipe (rdwy. drainage)	11 l. f.	3.00	7.82	5.00
24. 6-in. ext. qual. drain tile (drainage, rdwy.)	448 l. f.	1.15	.68	1.70
25. 8-in., as above	98 l. f.	1.50	1.00	2.25
26. 8-in. ext. qual. drain tile (rdwy. drainage with porous backfill)	753 l. f.	1.20	1.07	2.25
27. 10-in. ext. qual. drain tile (rdwy. drainage)	52 l. f.	1.75	1.50	2.40
28. 12-in., as above	192 l. f.	1.75	1.21	2.50
29. 15-in. pl. cem. conc. pipe (rdwy. drainage)	9 l. f.	2.00	7.00	3.10
30. 18-in. pl. cem. conc. pipe (storm sewers)	1,154 l. f.	3.00	3.65	4.10
31. 4-in. ext. qual. drain tile (underdrains)	4,287 l. f.	.60	.55	1.00
32. 21x8-in. tee pipe spec. (st. sewers under pavement)	1 ea.	5.00	5.00	10.00
33. 10-in. pipe specials (under pavement)	2 ea.	5.00	5.00	10.00
34. 30-deg. 21-in. L pipe spec. (rdwy. drainage)	1 ea.	22.50	9.00	25.00
35. Relay 6-in. pipe for roadway drainage	130 l. f.	.50	1.45	1.40
36. Standard No. 1 manholes	2 ea.	125.00	145.00	125.00
37. Standard No. 16 catch basins	32 ea.	140.00	166.00	160.00
38. Std. No. 1–3 catch basins (modified)	2 ea.	45.00	150.00	150.
39. Std. No. 7 catch basins with wood tops	3 ea.	50.00	145.00	100.
40. Std. No. 1–2–A catch basins	9 ea.	50.00	103.00	125.
41. Std. No. 11–A catch basins (mod. casting)	3 ea.	110.00	222.00	200.
42. Std. No. 2–2–A catch basins (no side inlets)	6 ea.	45.00	113.00	125.
43. Reset manhole castings to grade	8 ea.	10.00	63.00	25.
44. Type A riprap	27 s. y.	4.00	8.40	6.0
45. 4-in. concrete sidewalks	4,971 s. f.	.25	.26	.35
46. Remove and store guardrail	368 l. f.	.50	.63	.25
47. Aggregate for traffic bound side appr. (60% No. 4: 40% No. 7)	68 c. y.	3.00	3.34	4.0
48. Classified embankment (blanket course)	5,466 c. y.	1.25	1.51	1.35
49. Remove, dispose exist. conc. curb	2,257 l. f.	.20	.25	.25
50. Remove, dispose exist. conc. sidewalk	8,813 s. f.	.03	.06	.05
51. Remove, dispose exist. steps (11 units)	Lump Sum	55.00	76.00	200.0
52. Remove, dispose of pipe (to 15-in. dia.)	162 l. f.	.50	1.00	1.0
53. As above, over 15-in. dia	3 l. f.	1.00	1.30	2.0
54. 6-in. pipe removed for re-use	130 l. f.	.50	1.00	1.15
55. Remove, dispose exist. curb and gutter	222 l. f.	.50	.32	.35
56. 21-in. pl. cem. conc. pipe (storm sewers)	1,290 l. f.	3.25	3.40	4.75
57. 12-in. p. c. c. pipe (rdwy. drainage outlets)	40 l. f.	1.50	3.65	2.50
58. Exist. catch basins, manholes, inlets abandoned	15 ea.	10.00	4.00	10.0
59. Conc. steps, 6-in. riser, 12-in. treads	236 l. f.	1.50	1.58	2.25
60. Wood guard rail posts	645 ea.	2.50	4.28	4.0
61. Monodirectional markers, Dickson Model B (clear glass) or equal	262 ea.	1.00	2.20	3.0
62. Aggregate for maintaining traffic	125 c. y.	2.00	3.34	2.50
63. Calcium chloride, del'd. and applied	2.5 ton	40.00	57.00	60.0
64. One drilled well abandoned	Lump Sum	25.00	32.00	25.0

Pavement

Item	Quan.	Unit Prices (1)	(2)	(3)
65. 2-in. insulation course	1,933 s. y.	.25	.59	.15
66. Waterbound macadam base course, coarse aggregate	1,395 ton	3.00	2.71	4.00
67. As above, fine aggregate	511 ton	3.00	2.71	5.00
68. Furn. and incorporating black coloring in concrete	1,217.5 s. y.	.20	.25	.25
69. Asph. conc. surface course, Type A	73 c. y.	11.00	7.56	12.00
70. Bitum. surf. treatment, No. 6 aggr.	34 ton	3.00	2.41	3.25
71. Bitum. surf. trtmt. (seal coat)	1,011 gal.	.11	.28	.20
72. Asphaltic conc. leveling course	58 c. y.	11.00	7.50	12.00
73. Bituminous prime coat	2,092 gal.	.11	.28	.20
74. Bitum. surf. trtmt., bitum. material	2,427 gal.	.11	.28	.20
75. Bitum. surf. trtmt., cover aggr. No. 46	89 ton	3.00	2.39	3.25
76. Portland cem. conc. pavmt., for drives (6-in.)	211.4 s. y.	2.00	2.92	2.00
77. 7½-in. port. cem. conc. median pav't., Type A	1,217.5 s. y.	2.50	3.72	3.00
78. 7½-in. port. cem. conc. median pavmt., Type B	663.7 s. y.	2.50	3.71	3.00
79. 8-in. port. cem. conc. pavement	38,371.4 s. y.	2.15	2.37	2.40
80. Type 2-A integral concrete curb	12,617 l. f.	.25	.58	.20
81. Type 4-A integral concrete curb	622 l. f.	.30	1.44	.20
82. Spec. Type 6-A integral conc. curb	8,100 l. f.	.15	.51	.20
83. Type 2 comb. conc. curb and gutter, 24-in.	1,715 l. f.	1.00	1.77	1.50
84. Type 4 comb. conc. curb and gutter, 30-in.	219 l. f.	1.10	2.04	2.00
85. Type 2 comb. conc. curb and gutter 30-in	76 l. f.	1.50	2.66	2.00
86. 9-in. rein. concrete approach slab	356.6 s. y.	4.50	6.38	5.00

Structures—20-ft. span and under

Item	Quan.	Unit Prices (1)	(2)	(3)
87. Unclassified excavation, structures	177 c. y.	2.50	3.42	2.50
88. Channel excavation	227 c. y.	.80	2.29	1.00
89. Class E concrete, structures	12.9 c. y.	20.00	22.79	30.00
90. Class C concrete, structures	43.5 c. y.	30.00	27.66	35.00
91. Type B waterproofing	4.7 s. y.	2.00	.21	2.00
92. Reinforcing steel	3,941 lb.	.07	.076	.07
93. Remove portions exist structures	18 c. y.	10.00	15.11	20.00
94. Dowel holes	23 l. f.	1.00	2.52	1.00
95. 15-in. pl. cem. conc. pipe, incl. 5-in. encasement for roadway culverts	163 l. f.	4.00	4.44	5.00
96. 48-in. rein. conc. pipe, rdwy. culverts	122 l. f.	14.00	12.60	9.50

Roadside improvement

Item	Quan.	Unit Prices (1)	(2)	(3)
97. Aggregate for tree root aeration	27 c. y.	4.00	3.18	4.00
98. Renovating existing soil	586 M s. f.	3.00	2.52	2.00
99. Commercial fertilizer (4–12–4)	5,858 lb.	.04	.05	.06
100. Seeding, No. 2	4,355 s. y.	.04	.04	.04
101. Sodding	6,532 s. y.	.25	.38	.45

a Jap's-eye-view of a

WAR WEAPON

SAVE CRITICAL MATERIALS in selection, application and use of electrical equipment.

USE NEWLY DEVELOPED METHODS to speed vital war production.

KEEP EQUIPMENT RUNNING by proper Maintenance and Repair Service.

REPLACE CRITICAL MATERIALS with Micarta and Prestite.

SAVE SCRAP by systematic planning and salvage.

Wartime Conservation

Write today **for your free copy of Wartime Conservation, B-3206.**

When "sunken" ships come sailing back and "crashed" planes deliver another stick of bombs, the Japs must look with awe on the "weapon" that gives these damaged ships new life. This "weapon" is electric welding. By speeding fabrication and repair, this amazing process is speeding Victory.

There still remain, however, many places on the production front where the latest welding techniques are not being used to full advantage. Westinghouse suggests that you investigate them immediately.

One new process stitches steel together automatically 20 times faster than any other method. Another type of unit requires 30% less critical materials to build, eliminates troublesome arc-blow.

These and other methods of speeding war production and saving critical materials are suggested in the new 100-page book, "Wartime Conservation." Write for your free copy today. Address nearest office or Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

J-21268

WESTINGHOUSE

Westinghouse

PLANTS IN 25 CITIES ... OFFICES EVERYWHERE

102. Riprap for tree protection	35 s. y.	4.00	5.03	5.00
103. Hall's Japanese honeysuckle (2 yr.)	1,295 ea.	.60	.44	.90
104. Maple trees, 3-in., salvaged	3 ea.	20.00	19.00	12.00
105. Seeding and protecting rdwy. areas	58,925 s. y.	.05	.06	.045

Structures—over 20-ft. span

Item	Quan.	Unit Prices (1)	(2)	(3)
106. Unclassified excav., structures	1,280 c. y.	4.00	4.76	5.00
107. Class C conc., superstructure	1,462 c. y.	40.00	46.67	40.00
108. Class E. conc., pier walls	1,189 c. y.	30.00	24.10	30.00
109. Class E conc., footings	566 c. y.	20.00	14.60	25.00
110. Furn. and incorporate black coloring material in median strip	4 c. y.	1.00	6.25	5.00
111. Type B waterproofing	70 s. y.	2.50	2.27	2.00
112. Reinforcing steel	287,300 lb.	.065	.06	.06
113. Structural steel	313,000 lb.	.08	.07	.07
114. Wrought iron blast plates	4,500 lb.	.25	.11	.20
115. Field painting str. steel, incl. blast plates	317,500 lb.	.004	.006	.0038
116. ½-in. premolded expan. joint filler	34 s. f.	.40	.53	.50
117. 1-in. premolded expan. joint filler	34 s. f.	.80	.71	1.00
118. 1/16-in. sheet asbestos rubber packing	52 s. f.	.30	1.00	1.00
119. Expansion joint	8.1 l. f.	2.00	1.00	1.50
120. Bridge railing (timber with conc. posts)	785.5 l. f.	6.00	4.40	3.00
121. First test pile	Lump Sum	650.00	630.00	2,000.00
122. First test load	Lump Sum	500.00	567.00	500.00
123. Subsequent test load	Lump Sum	100.00	504.00	200.00
124. 14-in. rein. conc. piling	9,580 l. f.	3.00	3.72	3.50
125. 2-in. fiber conduit	800 l. f.	.50	.29	.35
126. 10-in. pipe for sanitary sewer	85 l. f.	2.50	3.33	1.00
127. Unclassified structural excavation	2,130 c. y.	2.50	1.22	3.50
128. Class C concrete, frame	1,080 c. y	30.00	25.28	30.50
129. Class E concrete, wing walls	420 c. y.	25.00	31.56	23.00
130. Class E concrete, footings	435 c. y.	20.00	13.40	18.00
131. Type A waterproofing	435 s. y.	1.00	1.13	1.00
132. Type B waterproofing	56 s. y.	2.00	2.27	2.00
135. Reinforcing steel	165,660 lb.	.065	.06	.06
134. ¼-in. premolded expan. joint filler	4 s. f.	.50	.75	2.00
135. 1-in. premolded expan. joint filler	810 s. f.	.75	.70	1.00
136. 1/16-in. sheet asbestos rubber packing	390 s. f.	.30	.95	1.00
137. Expansion joint	165 l. f.	2.00	.76	6.00
138. Bridge railing	156.2 l. f.	6.00	9.85	5.00
139. Bridge lighting system, complete	Lump Sum	500.00	951.00	2,000.00
140. 2-in. fiber conduit	225 l. f.	.50	.29	1.50
141. Porous backfill	295 c. y.	4.00	2.96	2.70
142. 8-in. bell and spigot rein. conc. pipe	310 l. f.	2.00	1.70	1.80
143. Furn. and incorporate black coloring matter in median strip	2 c. y.	2.00	6.50	100.00
144. Premium on industrial insurance	Lump Sum	4,000.00	7,350.00	4,000.00
145. Maintain traffic, incl. lights, signs, barricades and watchmen (24-hr. service)	Lump Sum	723.83	9,000.00	2,000.00

PEDESTRIAN SUBWAY APPROACHES CHICAGO, ILL.

OWNER: City of Chicago, Department of Public Works, O. E. Hewitt, commissioner.

PROJECT: Pedestrian subway approaches on North Ogallah Ave., between North Olmsted and North Avondale Avenues. Involves necessary common and rock excavation; filling (both sand and crushed limestone); construction of concrete retaining wall; damp-proofing; tile pipe sewer and drain; manhole and catchbasin; handrail; tree and stump removal; and concrete walkway and sidewalks. Walkway is 12-ft. wide and has 7½-ft. minimum vertical clearance under tracks.

CONDITIONS: Contractor to furnish all materials and complete work in 210 consecutive days. Rail and highway transportation facilities available. Wage rates are: skilled labor, $1.70 to $1.825 per hour; and common labor, $1.10 per hour.

BIDS: Fifteen bids were received January 29, 1943, ranging from the low of $12,063 to $29,480.

LIST OF BIDDERS:

1. Santucci Constr. Co., Skokie, Ill. (low bidder)	$12,063
2. James A. Sackley Co., Chicago, Ill	13,687
3. Izzi Constr. Co., Chicago, Ill	16,264
4. M. J. McDermott & Co., Chicago, Ill	16,633
5. Michuda Bros. Constr. Co., Chicago, Ill	16,677
6. George P. Cullen, Chicago, Ill	17,040
7. John A. McGarry & Co., Chicago, Ill	17,379
8. Casey & Emmert, Chicago, Ill	18,849
9. Hoeffer & Co., Chicago, Ill	19,218
10. S. N. Nielsen Co., Chicago, Ill	
11. Joseph Ventrella & Co., Chicago, Ill.	
12. Michael Pontarelli & Sons, Chicago, Ill	
13. E. L. Archibald Co., Chicago, Ill	
14. C. E. Carson Co., Chicago, Ill	
15. N. S. Mackie Co., Chicago, Ill	

Item	Quan.	Unit Prices (1)	(2)	(3)
1. Common excavation	1,450 c. y.	$1.40	$1.43	
2. Rock excavation	20 c. y.	1.00	2.50	
3. Filling (sand)	90 c. y.	1.50	2.50	
4. Filling (crushed limestone)	300 c. y.	2.10	3.25	
5. Retaining wall concrete	220 c. y.	27.00	29.70	
6. Concrete walkways and sidewalks	5,200 s. f.	.34	.34	
7. Additional portland cement	25 bbl.	2.75	2.70	
8. Damp-proofing	200 s. y.	1.00	1.29	
9. 8-in. tile pipe sewer	140 l. f.	1.70	2.15	
10. 8-in. tile pipe drain	620 l. f.	.75	1.49	
11. Manhole	1 ea.	140.00	93.00	
12. Catch basin	1 ea.	125.00	93.00	
13. Handrail	260 l. f.	1.15	.73	
14. Tree and stump removal	150 dia. in.	.03	.90	

HIGHWAYS, VIRGINIA

OWNER: Virginia Department of Highways, Richmond, Va

PROJECT: Construction of 13.76 miles of two-lane concret highway in Warwick, James City and York Counties, Virginia on Route 168, from a point 0.77 miles south of the intersectio of Rich Neck Road to Williamsburg. Each lane, of 9-in. plai concrete, is 11-ft. wide. Project also includes 20-ft. soil bitumin ous surface treated center strip.

CONDITIONS: Contractor to furnish all materials and com plete work in 250 days. Rail, highway and water transportatio facilities available at, or near, site of work. Minimum wag rates are: skilled labor, 60c. per hour; semi-skilled, 35c.; an common, 30c.

BIDS: Three bids were received December 22, 1942, rangin from the contract low of $1,143,397 to $1,247,663.

LIST OF BIDDERS:

1. W. H. Scott, Inc., Franklin, Va. (contract)	$1,143,39
2. Bero Engr. & Constr. Corp., Blackstone, Va	1,157,21
3. Keeley Constr. Co., Harrisonburg, Va	1,247,66

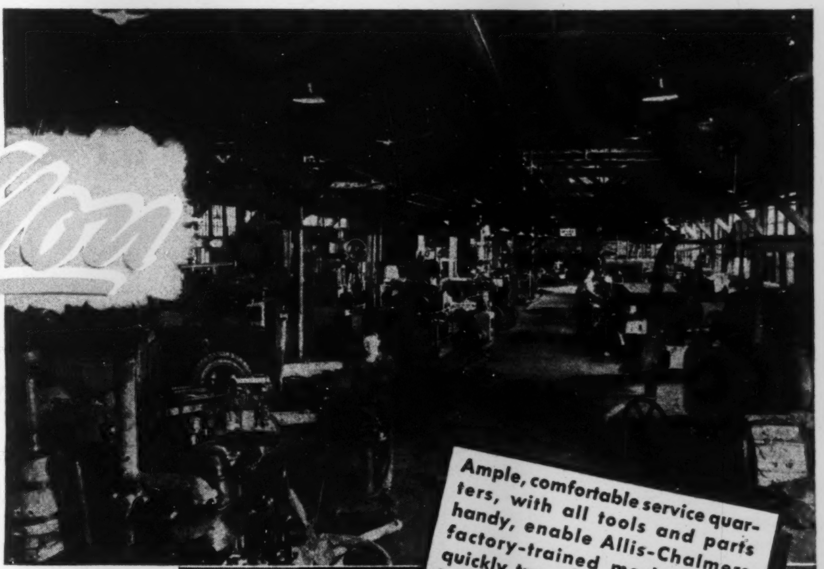
Item	Quan.	Unit Prices (1)	(2)	(3)
1. Clearing and grubbing	32 ac.	$400.00	$225.00	$350.00
2. Regular excavation	226,600 c. y.	.65	.65	.75
3. Borrow excavation	9,200 c. y.	.75	.75	1.50
4. Concrete, Class A	313 c. y.	64.00	48.00	55.00
5. Concrete, Class B	670 c. y.	64.00	35.00	45.00
6. Metal reinforcement	25,991 lb.	.10	.07	.10
7. Concrete right-of-way monuments	40 ea.	3.00	3.50	10.00
8. Subgrade underdrains, CD–1 or CD–2	1,800 l. f.	1.00	.95	.70
9. 15-in. concrete pipe	322 l. f.	2.25	3.25	2.00
10. 18-in. pipe	683 l. f.	2.90	4.00	2.50
11. 24-in. pipe	325 l. f.	4.25	4.75	4.00
12. 30-in. pipe	45 l. f.	6.50	6.00	6.00
13. 36-in. pipe	156 l. f.	9.00	7.75	8.00
14. Relay pipe	600 l. f.	2.50	2.50	2.00
15. 12-in. pipe	100 l. f.	1.20	2.75	1.50
16. Concrete, Class C	109 c. y.	64.00	25.00	50.00
17. Riprap	500 s. y.	4.50	2.65	5.00
18. Timber piling	3,800 l. f.	1.40	1.00	2.00
19. Reset right-of-way monuments	56 ea.	1.50	2.00	5.00
20. Federal-aid markers	2 ea.	6.50	5.00	5.00
21. High early strength std. gutter for entrances and street connections	40 l. f.	4.00	1.25	2.50
22. Plain comb. conc. curb and gutter	11,650 l. f.	2.40	1.35	2.10
23. Special curb drop inlets	12 ea.	125.00	125.00	150.00
24. Catch basins to be adjusted	5 ea.	50.00	20.00	25.00
25. Manholes to be adjusted	10 ea.	15.00	25.00	25.00
26. 3-in. wrought iron pipe	50 l. f.	4.00	1.00	2.00
27. 6-in. wrought iron pipe	50 l. f.	5.50	1.75	3.00
28. Reflectorized advance warning signs	6 ea.	25.00	50.00	150.00
29. Subgrade treatment	100,142 c. y.	1.30	1.75	1.60
30. Soil for grade changes and connections (10-in.)	22,106 c. y.	2.00	2.95	3.00
31. 6-in. soil for fill and secondary connections	1,000 c. y.	2.00	2.95	3.00
32. Soil (backfill around forms)	3,520 c. y.	2.00	2.95	3.00
33. Soil (irreg. out of center strip)	7,008 c. y.	2.00	2.95	3.00
34. Scarify and reshape exist. 20-ft. center strip	81,800 s. y.	.15	.30	.20
35. No. 9 stone for entrances	125 ton	3.50	4.25	4.60
36. 8-in. waterbound macadam for intersect.	3,100 s. y.	3.00	1.30	1.80
37. RT–3 to RT–11 bituminous mat'l	4,465 gal.	.20	.15	.20
38. Covering material	155 ton	3.50	4.25	4.60
39. RT–3 or RT–4 bituminous mat'l	54,120 gal.	.20	.15	.20
40. RT–5 or RT–6 bituminous mat'l	81,180 gal.	.20	.15	.20
41. Covering material	4,871 ton	3.50	4.25	4.60
42. Sand covering material	1,624 ton	3.00	3.40	4.00
43. 4-ft. by 6-in. conc. median strip	1,200 l. f.	2.00	1.25	2.00
44. 9-in. plain concrete pavement	178,596 s. y.	3.27	3.17	3.40

Pays You

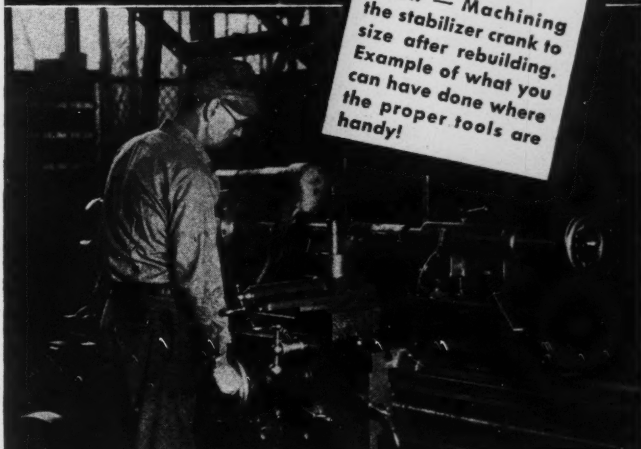
O HAVE
ERVICING
ANDLED IN
EALER'S SHOP!

**Common sense tells you, you will get
perior workmanship if your equip-
ent servicing is handled under ideal
nditions. That is why more and more
uipment owners are hauling their
nits into Allis-Chalmers dealer shops
r repairs, rebuilds, replacements.
hey are taking care of their hard-to-
place machinery... the best way...
e shop way! Dealer mechanics, work-
g in comfort, with proper illumina-
on, the right-type tools and genuine
arts... plus the expert help and ad-
ice of the shop foreman, can speedily
rn out better jobs. Delicate Diesel
arts are handled more carefully, too,
clean surroundings!**

**Next time your outfits need servic-
g... try this better, faster, shop plan. It
ill repay you many times over! Your
achines will be back to work about
s soon... will be ready to put in many
xtra hours of work with less down-
me. Call your Allis-Chalmers dealer.
ake arrangements to haul 'em in!**



Ample, comfortable service quarters, with all tools and parts handy, enable Allis-Chalmers factory-trained mechanics to quickly turn out highest-grade jobs.



Above — Rebuilding a stabilizer crank by welding.

• • •

Below — Machining the stabilizer crank to size after rebuilding. Example of what you can have done where the proper tools are handy!

ALLIS-CHALMERS
TRACTOR DIVISION—MILWAUKEE, WIS., U. S. A.

ARMY E NAVY

To Allis-Chalmers... the Army-Navy "E", first such award for tractor production.

NEW AIDS TO THE CONSTRUCTOR

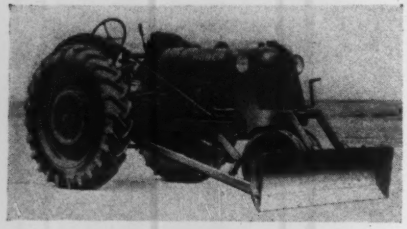
Pumpcrete Practice

A real manual and handbook of concrete placing practice by means of pump and pipeline is available for distribution to contractors, engineers, estimators and operating men. The manual has 164 magazine-size pages that give full information on every phase of concrete pumping.

A chapter is devoted to the general Pumpcrete placing methods. The machine, its adaptability, limitations, and accessories are described with typical construction layouts. Placing costs are discussed with actual figures and estimates cited for a limited number of actual cases.

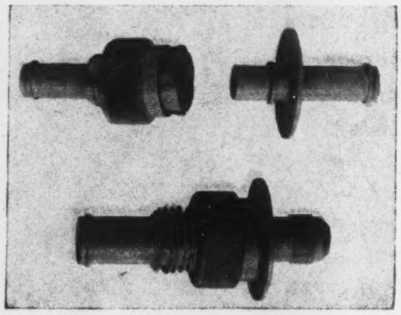
Proper distribution methods are given several pages of the manual. The mixing plant for production of concrete to be pumped is a complete chapter. A discussion of pumpable concrete with field corrections to mixes and instructions for pumping under unusual conditions is an important section. About one-half of the volume is filled with descriptions of actual jobs, many of them reprints from the current technical magazines of the outstanding jobs using Pumpcrete.

Copies are available from *Chain Belt Co., Milwaukee, Wis.*



Huber Bulldozer

The new bulldozer was built especially to meet a situation brought on by the war. Its purpose is to swing into action at a moment's notice after bombs have left craters on much needed airports or military roads on which armies and material must move unhampered. This small machine is smooth in operation, fast in action, levels off the broken surfaces promptly with a minimum of cost, and for a small initial investment, according to the manufacturer. The moldboard of the Huber bulldozer is 3/8 in. thick and 6 ft. long, total width with blade is 20 in. The blade clearance in raised position is 22 in., and depth below ground, 6 in. The moldboard is hydraulically controlled from operator's station, and the moldboard and blade are pivoted to push pole and retaining arms to provide a cleaning action to the moldboard as it is raised. Approximate weight is 600 lb.—*The Huber Mfg. Co., Marion, Ohio.*



Quick Disconnect Couplings

A new line of specially designed couplings for fuel, oil, cooling and instrument fluid lines has been developed. The couplings are available in all required sizes and designs for connecting tubing and hose in any necessary combination. The fittings are machined from 17ST and 24ST aluminum, and from bronze. To disconnect the special coupling a knurled ring is pulled backward, releasing dogs in the female half from their grip on a locking ring on the male half. To connect, the knurled ring is pulled back, compressing a coil spring behind it, and permitting the dogs to open; then the halves are pushed together and the knurled ring is advanced to force the dogs down behind the locking ring and hold them in that position. Sealing is accomplished by a rubber gasket on a shoulder within the female half. Tests indicate the connection is immune to vibration or shock, will withstand 925 lb. pressure without damage, hold 29 in. H.G. of vacuum,

Here Is Your Nearest Worthington Distributor

For Sales, Rentals and Service on BLUE BRUTE Portable Compresso Rock Drills and Air Tools. Get your EQUIPMENT-SAVER — FREE

see full page ad page 137

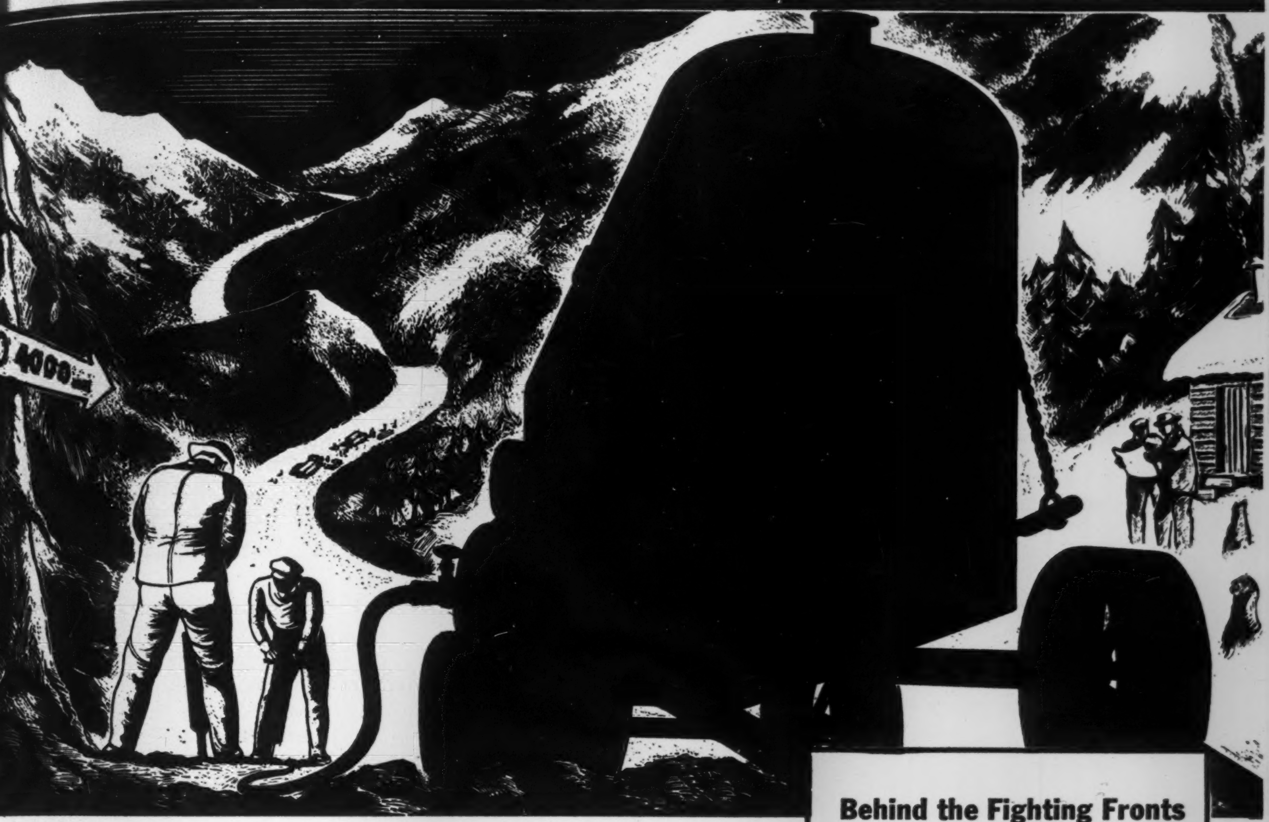
ALABAMA
Birmingham—Tractor & Equipment Co.
ARIZONA
Phoenix — Smith Booth Usher Company
ARKANSAS—Fort Smith — R. A. Young & So
Little Rock — R. A. Young & Son
CALIFORNIA
Los Angeles — Smith Booth Usher Company
COLORADO
Boulder — Standard Machine Works
CONNECTICUT
Hartford — The Holmes-Talcott Company
GEORGIA
Atlanta — Tractor & Machinery Co., Inc.
ILLINOIS — Chicago— Kennedy-Cochran Co.
Rock Island — Western Equipment & Supply C
INDIANA
Indianapolis — Reid-Holcomb Company
IOWA— Des Moines — Electrical Eng. & Constr.C
KENTUCKY — Harlan — Hall Equipment Sale
Louisville—Williams Tractor Company
LOUISIANA
New Orleans—Wm. F. Surgi Equipment Comp
MAINE — Ellsworth — Murray Machinery Co.
MARYLAND
Baltimore — D. C. Elphinstone, Inc.
MASSACHUSETTS
Boston — P. I. Perkins Company
Cambridge — W. W. Field & Son, Inc.
Springfield — The Holmes-Talcott Company
MICHIGAN
Detroit — W. H. Anderson Company, Inc.
MINNESOTA
Hibbing—Arrowhead Equipment & Supply Co.
Minneapolis — The George T. Ryan Company
MISSOURI
Kansas City — Machinery & Supplies Compan
St. Louis — Webster & Hedgcock Tr. & Eq. Co
MONTANA—Helena — Caird Engineering Work
NEW HAMPSHIRE
West Lebanon—P. I. Perkins Company
NEW JERSEY
Irvington — Smith Tractor & Equip. Co., Inc.
NEW MEXICO
Albuquerque — The Harry Cornelius Company
NEW YORK
Albany — Larkin Equipment Company
Albany—T. Southworth Tractor & Machy. Co.,
Menands
Binghamton — MacDougall Equipment Co.
Buffalo — Dow & Company, Inc.
Corona, L. I. — The Jaeger-Lembo Machine C
Middleton — S. T. Randall, Inc.
New York—Hubbard & Floyd, Inc.
Olean — Freeborn Equipment Company
Oneonta — L. P. Butts, Inc.
Syracuse — Harrod Equipment Company
NORTH CAROLINA
Durham — Constructors Supply Company, Inc.
OHIO — Cincinnati — The Finn Equipment Comp
Cleveland — Gibson-Stewart Company
Marietta — Northwest Supply & Equipment Co.
Toledo — M. W. Kilcorse & Company
OKLAHOMA
Oklahoma City — Townsco Equipment Co.
OREGON
Portland — Andrews Equipment Service
PENNSYLVANIA
Easton — Sears & Bowers
Harrisburg — N. A. Coulter
Oil City — Freeborn Equipment Company
Philadelphia — Metalweld, Inc.
Pittsburgh — John McC. Latimer Company
Wilkes-Barre — Ensminger & Company
SOUTH CAROLINA
Columbia — Bell-Lott Road Machinery Co.
SOUTH DAKOTA
Sioux Falls — Empire Equipment Co.
TENNESSEE
Chattanooga — James Supply Company
Knoxville—Wilson-Weesner-Wilkinson Co.
Memphis — Tri-State Equipment Company
TEXAS — Dallas — Shaw Equipment Company
Houston — McCall Tractor & Equipment Co.
San Antonio — Patten Machinery Company
VIRGINIA
Richmond — Highway Machinery & Supply Co.
WASHINGTON
Seattle — Star Machinery Company
Spokane—Andrews Equipment Service
WEST VIRGINIA
Fairmont — Interstate Engineers & Constructors
WISCONSIN
Eau Claire — Bradford Machinery Company
Green Bay — Nelson Machinery Company
Madison — Western Equipment Company
WYOMING
Cheyenne — Wilson Equipment & Supply Co.

Get more WORTH from air with WORTHINGTON

Buy Blue Brutes

Worthington Pump and Machinery Corp.

AIR-POWER NORTH TO TOKIO...



Ask them along the road to Fairbanks what Blue Brutes can do. The builders wanted rock-blasting air-power they could count on for the toughest construction job since Panama. They took Worthington Blue Brute Compressors and Air Tools —in "uniforms" of olive drab.‡

Over 1200 miles of boggy marshland, swamp-traps, axle-busting mountain peaks, through mud and ice, they helped blast the Alcan highway through. Alaska's, Tokio's fate hangs by that road-thread. Blue Brutes stood action's test.

Worthington Blue Brute Compressors . . . portable and semi-portable . . . gasoline, diesel and electric driven . . . have staying power in a pinch because like road-trained champion heavy-weights they're gentle-breathing. The improved Feather* Valve stops gulping "back talk", when lesser breeds whine for the tool shed. *They deliver more air*, steadily, per power-dollar.

Smooth, easy-handling strength makes Worthington Rock Drills and Air Tools also your best "brutes" for fast, historic construction. Sturdy, quality-strong, *they use less air*. Your test will prove it.

‡Blue Brute Compressors and Air Tools are painted olive drab for the Army. *Reg. U. S. Pat. Off.

Behind the Fighting Fronts with

BLUE BRUTES

A famous West Coast shipbuilder, who recently broke all records building Liberty Ships, buys Blue Brutes to provide air-power for a multitude of operations, 24 hours a day. Blue Brutes are performing like this in hundreds of Army camps, Navy yards, air bases and ordnance plants throughout the country. Your nearest distributor is listed on page 136

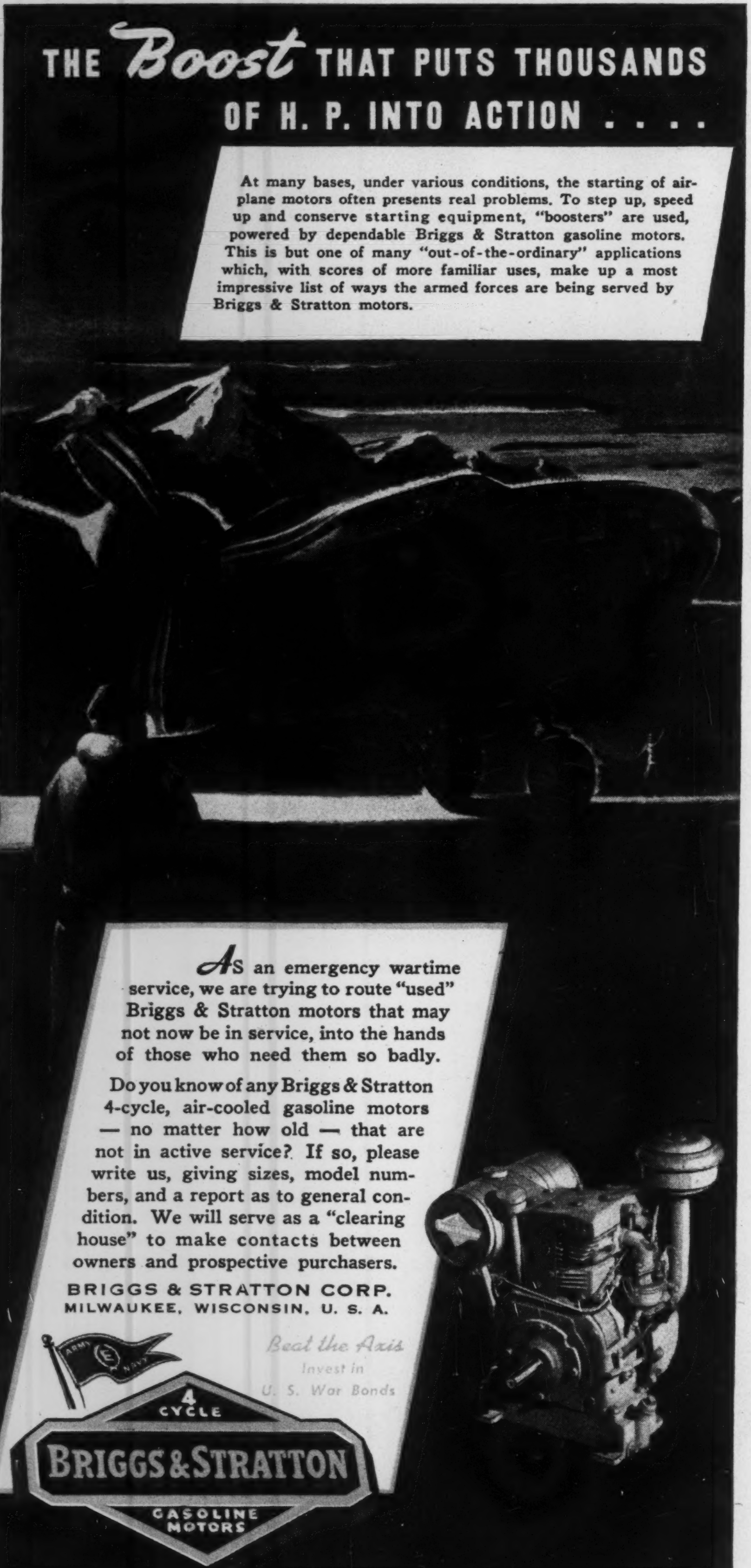
Get more WORTH from air with WORTHINGTON

BUY BLUE BRUTES

pressors from 60 to 500 cu. ft. capacity in mount- to suit all jobs. Rock Drills and Air Tools that have always set the pace for easy operation — available in a wide range of weights and sizes.

WORTHINGTON

Worthington Pump and Machinery Corporation, Harrison, N. J. Holyoke Compressor and Air Tool Department, Holyoke, Massachusetts



THE *Boost* THAT PUTS THOUSANDS OF H. P. INTO ACTION . . . .

At many bases, under various conditions, the starting of airplane motors often presents real problems. To step up, speed up and conserve starting equipment, "boosters" are used, powered by dependable Briggs & Stratton gasoline motors. This is but one of many "out-of-the-ordinary" applications which, with scores of more familiar uses, make up a most impressive list of ways the armed forces are being served by Briggs & Stratton motors.

As an emergency wartime service, we are trying to route "used" Briggs & Stratton motors that may not now be in service, into the hands of those who need them so badly.

Do you know of any Briggs & Stratton 4-cycle, air-cooled gasoline motors — no matter how old — that are not in active service? If so, please write us, giving sizes, model numbers, and a report as to general condition. We will serve as a "clearing house" to make contacts between owners and prospective purchasers.

BRIGGS & STRATTON CORP.
MILWAUKEE, WISCONSIN, U. S. A.

Beat the Axis
Invest in
U. S. War Bonds

has a pressure drop approximately that across a 2-ft. length of same dia ter hose, and is not affected by a w range of temperatures. Marine and dustrial models are available from in. to 10 in. in size.—*E. B. Wiggins Tool Co., 3324 East Olympic Blvd., Angeles, Calif.*

Glass Fiber Cable Hanger

A durable, glass-fiber cable hang has been developed for special use shipyards and on construction projec which is impervious to moisture. T hanger is capable of supporting appro mately 200 lb. The glass fibers are pr tected and the insulation value increas by a heat-resisting varnish treatmen The standard size hanger is 14 in. lon by 1½ in. wide, and a ¼-in. metal gro met in each end permits nailing wooden pillars. Straps are used to su port cable as shown in the above illu tration, or can be wrapped around cab to prevent slippage.—*Westinghouse Ele tric & Mfg. Co., Dept. 7-N-20, Ea Pittsburgh, Pa.*

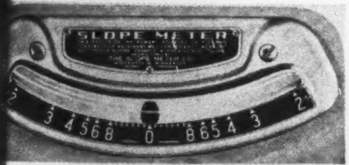
Blueprint Printer

A new blueprint printer has bee developed, which requires as little tim as 20 sec. for ordinary blueprints, an developing time for a black and whit print is only 10 sec. It is a sturd convenient, portable table model, and i can be plugged into any standard elec tric outlet. The machine comes in tw sizes: for prints up to 12x18 and 18x2 in. The actual printing surface is ove size on both size machines; this pre vents the crowding of prints, overlappin rred edges. Printing on a curved urface gives perfect contact with- e inconvenience of wrapping the around a cylinder. Tracings, gs, letters, invoices or any written nted matter can be quickly and reproduced. It is claimed by the cturers that prints can be pro- on this machine at a cost of less ½ cents per sq. ft.—*Peck and , 4325 Addison St., Chicago, Ill.*

HIGH VOLTAGE SIDE
LOW VOLTAGE SIDE
AIR-COOLED DISTRIBUTION TRANSF

Air-Cooled Distribution Transformers

is specially designed air-cooled former requires no liquids, such as r an insulating and cooling medium, offers a high degree of safety, not inable in liquid-cooled transformers, rding to the manufacturer. Because is safe construction, the equipment be located anywhere indoors without rouble or expense of building a pro- e vault. Inspection and mainte- e are simplified, due to elimination ch devices as valves, cooling tubes, d level gages, gaskets, etc. Since no room is required for installation of equipment, it can be placed where ng is low or on platform above work- area, leaving important floor space production purposes. They can be ished up to 500-Kva in voltages to) volts, single-phase, three-phase, and t-connected three to two or two to -phase in one unit.—*Eisler Engi- ing Co., 740 South 13th St., Newark,*



Slope Meters

his meter can be used to advantage all sizes of tractors, bulldozers, pers and graders, and the instrument matically shows the exact grade or e on which the machine is operated. accuracy or life of the instrument ot affected by rain, dust, snow or

Here's Another Task this WOOD Does Well

SEWAGE PLANTS are notoriously tough on the materials that go into their construction. Corrosive fumes and high humidities soon prove the master of most metals and ordinary wood. But Wolmanized Lumber* has proved equal to the demands placed on it here.

WOLMANIZED LUMBER, serving as covers and walkways over outdoor tanks, and as baffles, gates, roof structures and planking, has given an excellent account of itself. Service records covering millions of feet of Wolmanized Lumber, at work in sewage plants and in equally tough spots elsewhere in industry, confirm this.

WOLMANIZED LUMBER is ordinary wood to which an "alloy" has been added, making it highly resistant to decay and termite attack. Vacuum-pressure impregnation with Wolman Salts* preservative does the trick. Strict laboratory control of processes in the various Wolmanizing plants throughout the country assures uniformity of product.

THE USE OF THIS long-lived lumber introduces no unusual problems. Construction goes up easily and fast. All of the advantages of working with wood are retained—low cost, light weight, strength, resilience. Wolmanized Lumber is clean, odorless, and it can be painted. Upkeep costs are low, making money ordinarily needed for maintenance available for other purposes. American Lumber & Treating Company, 1649 McCormick Building, Chicago, Illinois.

*Registered Trade Mark

"Alloyed" FOR ENDURANCE

WOLMANIZED LUMBER

THE *Boost* THAT PUTS THOUSANDS OF H. P. INTO ACTION . . . .

At many bases, under various conditions, the starting of airplane motors often presents real problems. To step up, speed up and conserve starting equipment, "boosters" are used, powered by dependable Briggs & Stratton gasoline motors. This is but one of many "out-of-the-ordinary" applications which, with scores of more familiar uses, make up a most impressive list of ways the armed forces are being served by Briggs & Stratton motors.

AS an emerger
service, we are trying to r
Briggs & Stratton motor
not now be in service, into
of those who need them

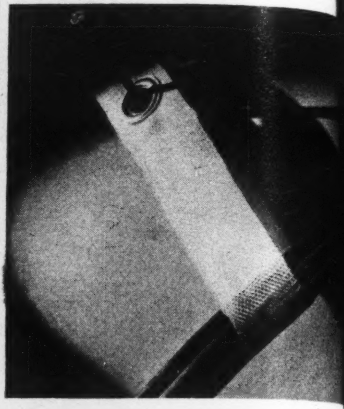
Do you know of any Briggs &
4-cycle, air-cooled gasoline
— no matter how old — t
not in active service? If so,
write us, giving sizes, model
bers, and a report as to genera
dition. We will serve as a "cle
house" to make contacts betv
owners and prospective purcha

BRIGGS & STRATTON COR
MILWAUKEE, WISCONSIN, U. S.

Beat the
Invest in
U. S. War Bo

4 CYCLE
BRIGGS & STRATTON
GASOLINE MOTORS

has a pressure drop approximately that across a 2-ft. length of same dia ter hose, and is not affected by a w range of temperatures. Marine and dustrial models are available from in. to 10 in. in size.—*E. B. Wiggins Tool Co., 3324 East Olympic Blvd., Angeles, Calif.*



Glass Fiber Cable Hanger

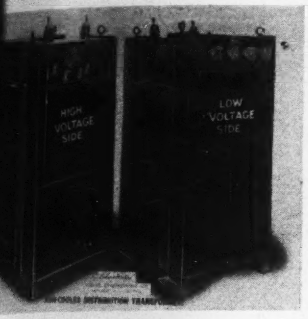
A durable, glass-fiber cable hang has been developed for special use shipyards and on construction projec which is impervious to moisture. T hanger is capable of supporting appro mately 200 lb. The glass fibers are pr tected and the insulation value increase by a heat-resisting varnish treatme The standard size hanger is 14 in. lo by 1½ in. wide, and a ¼-in. metal gro met in each end permits nailing wooden pillars. Straps

TIGH

BOU

mately
ame di
by a
ine and
le from
Viggins
Blvd.,

rred edges. Printing on a curved urface gives perfect contact with- e inconvenience of wrapping the around a cylinder. Tracings, gs, letters, invoices or any written nted matter can be quickly and reproduced. It is claimed by the acturers that prints can be pro- on this machine at a cost of less ½ cents per sq. ft.—*Peck and* , 4325 *Addison St., Chicago, Ill.*



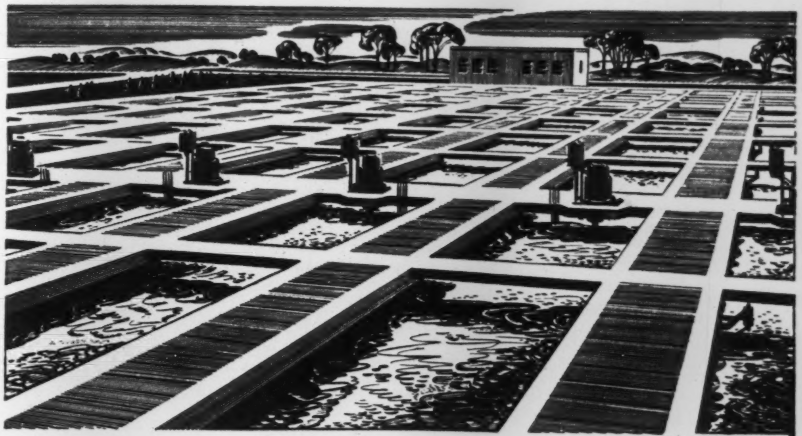
nger
e hang
l use
projec
ure. T
appro
are p
ncrease
eatme
in. lo
al gro
ling

Air-Cooled Distribution Transformers

is specially designed air-cooled former requires no liquids, such as r an insulating and cooling medium, offers a high degree of safety, not nable in liquid-cooled transformers, rding to the manufacturer. Because s safe construction, the equipment be located anywhere indoors without ouble or expense of building a pro- e vault. Inspection and mainte-

HTLY

UND



Here's Another Task
this WOOD Does Well

SEWAGE PLANTS are notoriously tough on the materials that go into their construction. Corrosive fumes and high humidities soon prove the master of most metals and ordinary wood. But Wolmanized Lumber* has proved equal to the demands placed on it here.

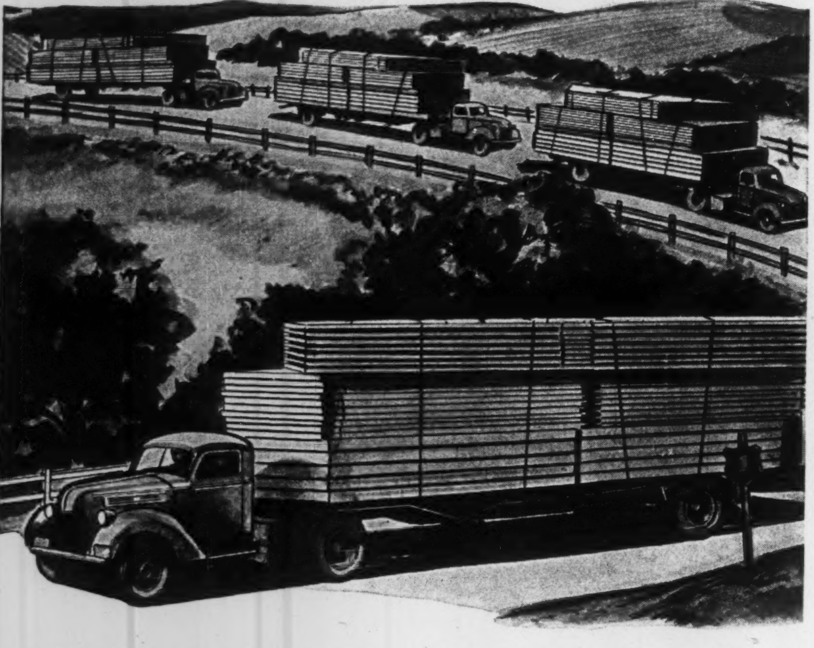
WOLMANIZED LUMBER, serving as covers and walkways over outdoor tanks, and as baffles, gates, roof structures and planking, has given an excellent account of itself. Service records covering millions of feet of Wolmanized Lumber, at work in sewage plants and in equally tough spots elsewhere in industry,

rdinary wood to which an "alloy" has
ighly resistant to decay and termite
impregnation with Wolman Salts*
. Strict laboratory control of processes
zing plants throughout the country
duct.

ved lumber introduces no unusual
oes up easily and fast. All of the
h wood are retained—low cost, light
ice. Wolmanized Lumber is clean,
painted. Upkeep costs are low, mak-
eded for maintenance available for
Lumber & Treating Company, 1649
cago, Illinois.

FOR ENDURANCE
IZED LUMBER

HOUSING THAT MOVES
to the Troops



Housing for thousands of troops moves across the country at 35 miles an hour from the Texas Pre-Fab plants . . . five houses on each giant carrier . . . destined to provide *comfortable* living quarters for our soldiers in this country and abroad.

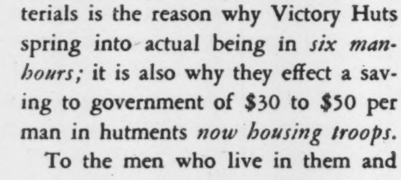
Behind these shipments, now rolling by hundreds daily, lies a story of determination by government that in this war our fighters should get the kind of housing they need and deserve—*weathertight, Air-Space* insulated housing, fully *pre-fabricated, demountable and portable.*

One answer was the Texas Pre-Fab Victory Hut—now "home" to tens of thousands of troops.

Pre-fabrication from available materials is the reason why Victory Huts spring into actual being in *six man-hours;* it is also why they effect a saving to government of $30 to $50 per man in hutments *now housing troops.*

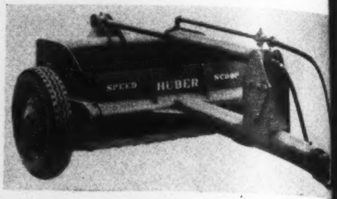
To the men who live in them and to a government that must meet the expense, Victory Huts are therefore an answer to one of the most important aspects of war — housing our fighting forces *well, efficiently and economically.*

To Producers of War Materials—Texas Pre-Fabricated House and Tent Company also manufactures Victory Homes. What the Victory Hut is to the armed forces, the Victory Home is to the civilian "soldier of the machine" in overcrowded defense areas. Ask us how quickly we can right now alleviate the housing shortage near *your* plant. Or send for descriptive booklet, "Victory Huts and Homes."



TEXAS PRE-FABRICATED HOUSE AND TENT CO.
Dallas, Texas
MAKERS OF "VICTORY" HUTS AND "VICTORY" HOMES
TRADE MARK TRADE MARK

sleet, and no oiling or care is requ
once they are installed, so states
manufacturer. Advantages claimed
use of this instrument are as follo
makes accurate slopes in less time,
duces machine time in making per
highway crowns, speeds up night w
eliminates costly hand checking, pern
construction and checking of vari
slopes while machine is in motion,
vents wavy slopes, and gives a continu
check between stakes—of various ty
sizes, etc.—*The Slope-Meter Co., 6*
Fourth Ave., South Minneapolis, Minn



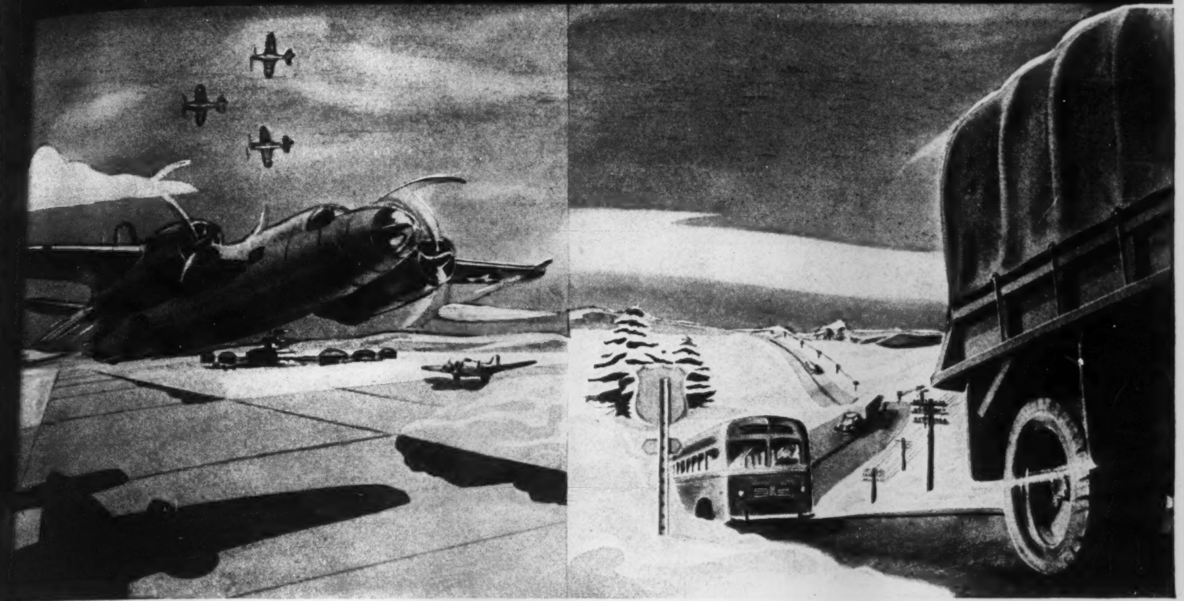
Speed Scoop

A new scoop has been designed
meet the urgent need for a versat
small scraper unit for emergency
in clearing highways, streets and a
ports. The speed scoop can be broug
into action by only attaching it to
tractor. It is claimed that the machi
is three to six times as fast as larg
scrapers and requires but one man
handle efficiently. Loading is acco
plished with an easy rolling moveme
of the earth, which produces draw-b
pull. A simple hydraulic cylinder co
trols the scoop and its blade adju
ment to the earth. The hydraulic ra
action makes it possible to dump th
dirt in one pile or spread it to a
desired thickness, and backfilling, shou
dering operations, dumping in odd co
ners or over embankments can be do
with a full measure of accuracy. Bui
in two sizes, for operation with 20-
30-hp. tractors, or 35- to 50-hp. tractor
—*Huber Mfg. Co., Marion, Ohio.*

Waterproofing Paint

The problem of controlling seepag
of water through brick, cement and co
crete walls is said to be solved throug
the development of a new waterproo
ing mineral paint. Various application
of this paint, known as Aquella, hav
demonstrated, the manufacturer say
that it is effective on unpainted bric
cement and concrete interior walls su
jected to dampness, seepage, condens
tion, etc.; and in basements, tunnel
storage magazines, pump wells, sump
etc. The paint is also suitable for su
faces subject to moisture, steam, fum
and excessive humidity. The paint is
white powder composed of properly ba
anced ingredients, which due to the
minutely dispersed aggregates, close th

RUNWAYS! HIGHWAYS!



Clear of Snow...and SMOOTH!

EXPERIENCE over the last 5 years demonstrates that Vinsol-treated cement is an ideal cement for runways and highways, for use in foundation work, flood-wall construction and slip-form casting. Not only does it save time and money in placing, but it virtually eliminates scaling.

Exhaustively Tested

Convincing proof that Vinsol-treated cement resists surface scaling is established by experiences in many Northern States. For example: In several tests Vinsol-treated cement was laid side by side with normal portland cement. While the normal portland scaled right up to the joints, the Vinsol-treated cement remained in almost perfect condition, winter after winter, in spite of constant freezing, thawing, and the surface action of de-icing agents.

Contractors Enthusiastic

Another advantage of Vinsol-treated cement in its nationwide applications, is its superior workability. It is more plastic. There is less segregation of the aggregate; less tendency to form mortar pockets. It is easier to spread; faster to finish. As a result crews are able to work closer to the mixer, thus saving time and money.

Vinsol-treated Cement Easy to Obtain

You can probably get Vinsol-treated cement with full instructions for its use from your local supplier. We have a 44-page booklet, "Better Roads Ahead." You'll find it practical, instructive, well worth reading. Mail the coupon below for your copy.

VINSOL*-TREATED
CEMENT
RESISTS SCALING

eg. U. S. Pat. Off.

Specify Vinsol-treated Cement for Longer Surface Life

NAVAL STORES DEPARTMENT
HERCULES POWDER COMPANY
INCORPORATED
974 MARKET ST., WILMINGTON, DELAWARE

Gentlemen:
Please send me a copy of 44-page book, Better Roads Ahead, telling the complete story of Vinsol-treated cement.

Name____________________
Company____________ Title________
Address____________________
City____________ State________
LL-93

PLUS TWO
Fuller
TRANSMISSIONS

The builder of your truck selected a Fuller Transmission because he gave your job and your post-purchase needs first consideration. But not only does the Fuller Transmission give you the correct gearing for your truck's load and the route it will cover but it adds two definite values to the truck's performance.

1. Ease of operation.—When the driver shifts from one speed to another the gears slip into position easily . . . smoothly.

2. Quiet running. Not only does this make driving more pleasant but it is a significant sign of less wear and longer gear life.

For the Assistance of Mechanics and Service-men—The new Fuller *Mechanic's and Driver' Handbook* gives detailed, step by step, fully illustrated, instructions for assembling or dis-assembling all models of Fuller transmissions. Write for your free copy. Address Service Department, Fuller Manufacturing Company, Kalamazoo, Michigan.

FULLER MANUFACTURING COMPANY • KALAMAZOO MICHIGAN

ALL Your Canvas Needs . . . .

. . . Can be met through ONE reliable source when you specify *Dandux* in ordering *anything* of canvas. Tarpaulins, baskets, hampers, canvas bags and covers—when you need these or other canvas items, investigate Dandux prices and specifications *first.* You'll find it pays to standardize on Dandux.

C. R. DANIELS, INC.

44 West St. New York, N. Y.

Chicago • Los Angeles • Boston • Buffalo
Cincinnati • Cleveland • Dallas • Detroit
Newark • Philadelphia • Pittsburgh
and other cities • Cotton Duck Mills: Daniels, Md.

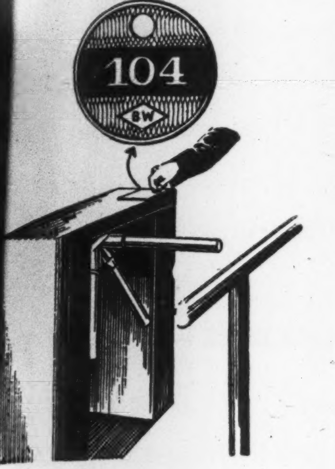
smallest pores of the wall. Applied wet, unpainted brick, cement and crete walls, the paint forms a pe nent bond with the wall itself and not peel, blister or flake. Two coats said to be sufficient to render the impermeable against capillarization seepage of water.—*Modern Waterpr ing Paint Co., 1270 Sixth Ave., York, N. Y.*

Instrument for Attaching Drawings to Drawing Boards

A new method of attaching drawi and blueprints to drawing boards, wh eliminates the necessity of moving T-square over thumb tack heads claimed by the manufacturers of a s cial type of sticker, as illustrated abo These stickers are paper thin, lie f are applied without moistening, and easily peeled off without a trace or affe ing the surface to which they are tached. They come in a variety of siz and shapes.—*Avery Adhesives, 451 E Third St., Los Angeles, Calif.*

Plastic Electric Drill

Development of a new plastic ¼-in portable electric drill has been announce after nearly a year in which large quan tities of the drill have been produce under Army contract, and the product i now made available for general use Tests prove that this new drill has more power per pound, greater strength and protection from shock, and to be more act, lighter in weight, and cooler ndle than any machine of previous uction, according to the manufac- The grip handle, field case and case of the drill are constructed new, tough, light weight "THOR- plastic developed exclusively for purpose.—*Independent Pneumatic Co., 600 West Jackson Blvd., Chi- Ill.*

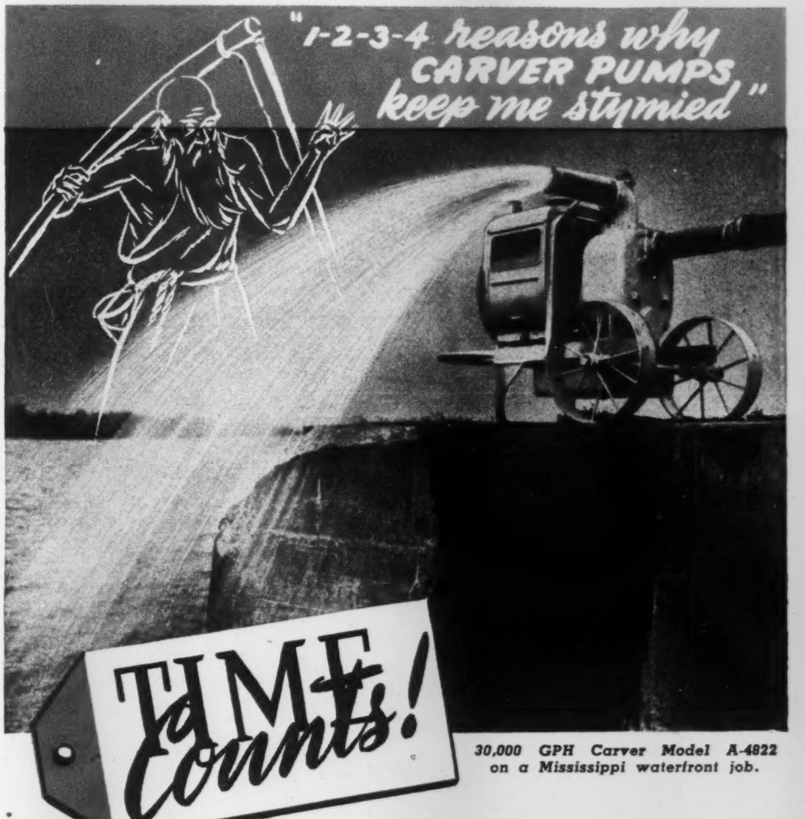


Check-Controlled Turnstile

A new check-controlled turnstile has n developed for special use wherever ge numbers of workers are employed. machine is operated by a metal ck which is deposited in the machine, s unlocking it, permitting the em- yee to enter, and at the same time isters the employee's number stamped the metal check. For further in- mation address—*Perry Turnstile Co., Park Ave., New York, N. Y.*

Safety Devices for Women Workers

Recognizing the importance of the part omen are today playing in all industry an aid to the war effort, Boyer- mpbell Co. have developed a number safety devices especially designed for eir use, which include such items as e face shield shown in illustration bove; special clothing—caps, gloves,



"1-2-3-4 reasons why CARVER PUMPS keep me stymied"
TIME Counts!

30,000 GPH Carver Model A-4822 on a Mississippi waterfront job.

1 Lifetime Seal — Keeps water in and air out — for good! Wearing surfaces made of Tungsten Carbide — so hard it will cut glass!

2 Simplified Design — Fewer wearing parts or surfaces; no "gadgets" to clog or wear . . . trouble is licked *before* it starts!

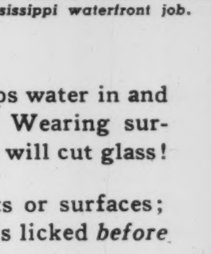
3 "Streamlined" Flow — for increased efficiency.

4 Long wearing Renewable Impeller & Liner — Impeller wear is restricted to one side only; both impeller and liner easily renewable at low cost when *extra* hours of service cause eventual wear!

Carver centrifugals are built in gas engine, electric motor or belt-driven models in capacities from 3,000 to 125,000 GPH. For complete information see your Carver distributor, or write directly to:

THE CARVER PUMP CO.
Muscatine, Iowa

CARVER CENTRIFUGAL Certified PUMPS



FOR VICTORY
BUY
UNITED STATES SAVINGS BONDS AND STAMPS

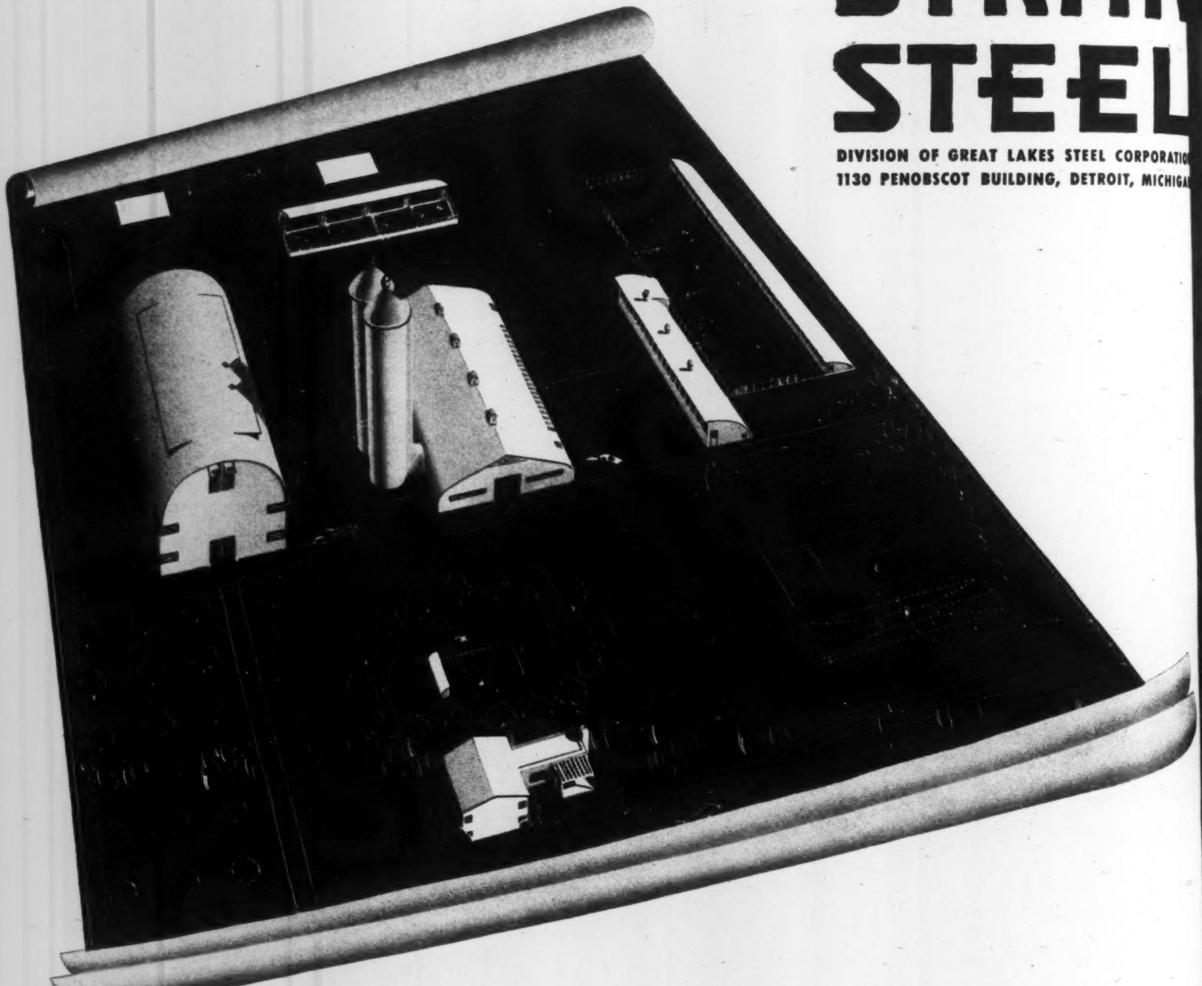
FROM plowshares to complete farm buildings is but a logic process of evolution in the development of steel. It illustrat how the scope and usefulness of this versatile metal hav been expanded to meet man's needs.

Metamorphosis of a Plowshare

Stran-Steel is today accomplishing things with steel whic were impossible a few short years ago. Under the stimulu of important war assignments, new practices and techniqu have been devised . . . new systems worked out . . . ne methods brought to light. Stran-Steel's engineering achievements promise a new medium of expression to the architect and designers of tomorrow.

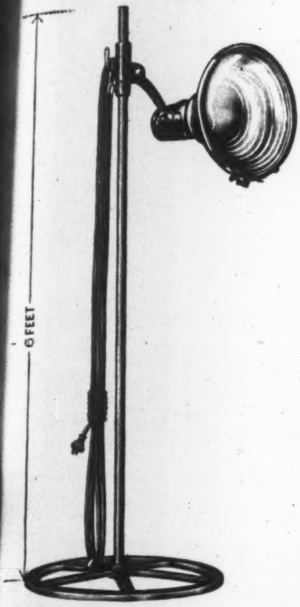
STRAN STEEL

DIVISION OF GREAT LAKES STEEL CORPORATIO
1130 PENOBSCOT BUILDING, DETROIT, MICHIGA



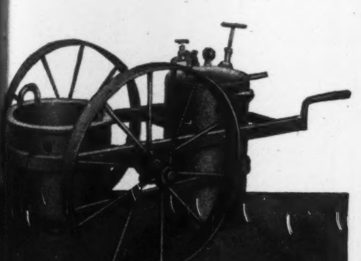
UNIT OF NATIONAL STEEL CORPORATION

, hair nets, etc. A catalog describ- these items will be sent upon re- .—*Boyer-Campbell Co., Safety Divi-* *Detroit, Mich.*



Portable Floodlight

A new portable floodlight is now on the rket, whose assembly is adjustable in ertical range from bottom to top of 6-ft. pipe standard set at an angle izontally and at 360 deg. radius. A t iron circular base of 20-in. dia. prodes stable footing, yet permits easy rtability. Either 300 or 500 watt mps can be accommodated and clear nvex or stippled convex diffusing heatistant lenses are available. The 12-in. flector is chromium plated for high recting efficiency—*Steber Manufacturing* ., *2451 N. Sacramento Ave., Chicago,*



Lead Melter

For melting of lead, babbitt and other ft metals, a new model lead melter is w on the market. This melter is furshed with a removable cast iron pot ving capacity of 430 lb. It is equipped th oil burner, for kerosene or distillate,

LOW COST FLOORS for WAR HOUSING!

STREAMLINE
STREAMLINE
HARDWOOD FLOORING
STREAMLINE

Save Time! Save Money! With Bruce FACTORY-FINISHED STREAMLINE FLOORING!

No wonder leading architects and contractors everywhere are enthusiastic about this amazing factory-finished flooring for war housing! *It's ready for use the instant it's laid!* Requires no sanding or finishing on the job. The 3¼" wide strips lay fast, too! Streamline Flooring saves days of time—expedites the work of other trades—helps avoid penalties. Costs no more, usually less, than ordinary flooring finished on the job. Widely used on large war housing projects from coast to coast. Write now for further information and your free copy of our booklet, "Low Cost Floors for War Housing."

E. L. BRUCE CO., 1660 Thomas St., Memphis, Tenn.

BRUCE *Factory-Finished* STREAMLINE HARDWOOD FLOORING
Trade-Mark Reg. U. S. Pat. Off.
A PRODUCT OF E. L. BRUCE CO., MEMPHIS, TENN.

OHIO LOCOMOTIVE CRANES
15 to 50 TONS CAPACITY
DIESEL • ELECTRIC • GASOLINE • STEAM
The OHIO LOCOMOTIVE CRANE CO.
BUCYRUS OHIO

THE MOUNT VERNON BRIDGE CO.
Engineers Contractors
STRUCTURAL STEEL
RAILWAY AND HIGHWAY BRIDGES
BUILDINGS AND VIADUCTS
MOUNT VERNON, OHIO

FLEXPEDITE

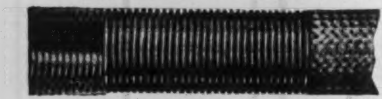
Your Conversion—Assembly—Production

with

REX-WELD

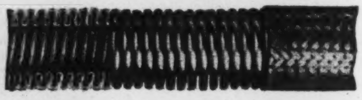
Flexible Metal Hose

Rex-Weld Hose—Annular Corrugations



RW-80 Unbraided ——— RW-81 Braided

Rex-Weld Hose—Helical Corrugations



RW-90 Unbraided ——— RW-91 Braided

—General Data—

	STEEL	BRONZE
Sizes	To 4″ I.D.	To 4″ I.D.
Pressures	To 14,500 p.s.i.	To 14,500 p.s.i.
Temperatures	To 1000° F	To 450° F.
Lengths	To 50′	To 50′

—Use Chart—

	*STEEL	BRONZE
Saturated Steam		✓
Superheated Steam	✓	
Sulphur Bearing Oil	✓	
Oxygen		✓
Ammonia	✓	
Carbon Dioxide	✓	
Sulphur Bearing Grease	✓	
Critical Vibration		✓
Non-Sparking		✓

*Protective Coatings Can Be Applied for Corrosion Protection (To Conserve Critical Copper Bearing Alloys).

Couplings: REX-TITE Mechanical (Re-attachable) Couplings; Solder Couplings; Brazed and Welded Couplings and Flange Assemblies for Rex-Weld Flexible Metal Hose.

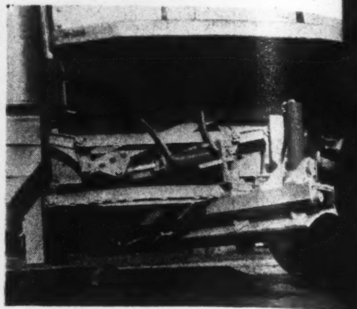
Ask for Engineering Recommendations

CHICAGO METAL HOSE CORPORATION

General Offices: MAYWOOD, ILLINOIS

Factories: Maywood and Elgin, Ill.

and has a 15-gal. capacity fuel tank. Th tank is provided with hand air pum pressure gage, safety filler and strainer valve. The unit is mounted 30-in. dia. steel wheels. It can thus b moved readily over rough terrain, well as being convenient for use in i dustrial plants or on hard surfaces. Th machine has a folding leg to prevent ti ping over. Shipping weight, uncrated is 425 lb.—*White Mfg. Co., Elkhart, In*



Snow Scraper

An underbody blade useful for clearing packed snow and ice from runway or in windrowing snow ahead of othe machines, is available as a unit for truck mounting that will be found valuable for normal maintenance work. The unit has full hydraulic control.—*Willett Manufacturing Co., Grand Rapids, Mich.*

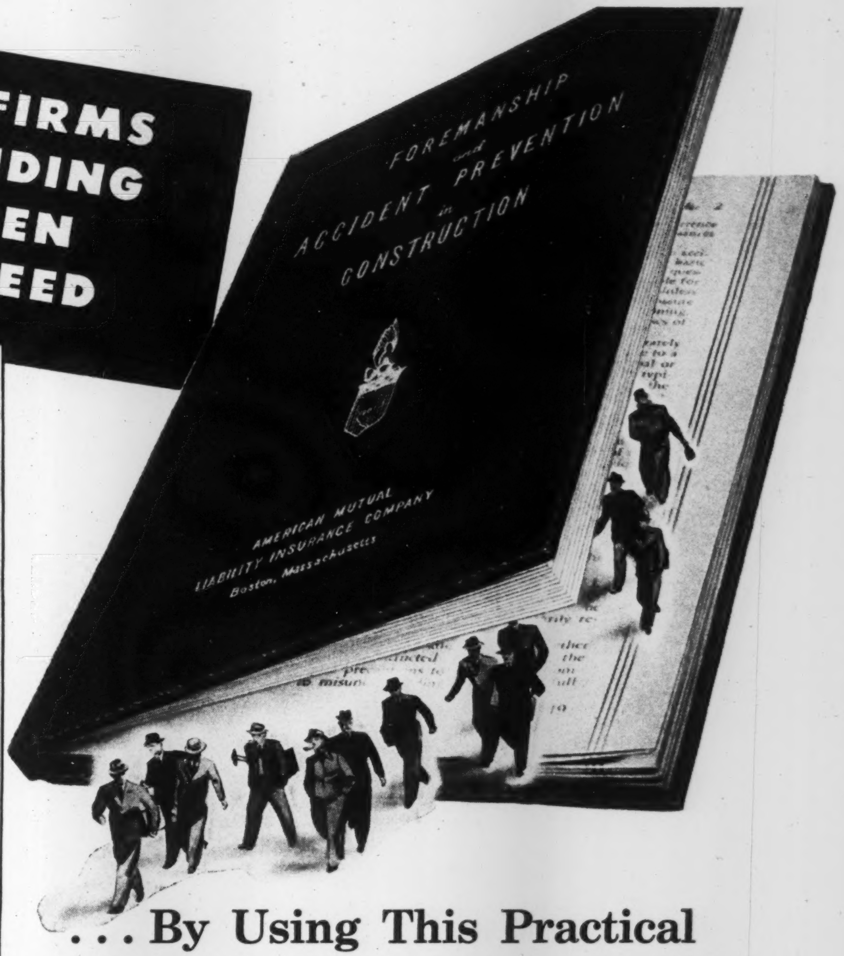
Clay Septic Tanks

A new design for vitrified clay septic tanks, said to have great flexibility of capacity and uniform flow throughout the unit is now available through the Robinson Clay Product Co. The feature provides more volume for longer decomposition of raw sewage and therefore a purer effluent. The septic tank is said to automatically decompose, purify and dispose of household wastes from bathroom and kitchen, eliminating the use of a cess pool, and is installed entirely underground.—*The Robinson Clay Product Co., Akron, Ohio.*

New Welding Electrode

A new electrode characterized by rapid burn-off, smooth operation and uniform deposit of highly alloyed, tough, hard surfacing metal, which is sufficiently soft in the as-deposited condition to be ground according to the best practice employed in rebuilding track rollers, has been developed. The product has special application for building up track rollers, rails and other similar parts of machines subject to a combination of impacts and heavy bearing wear.—*T. G. LeTourneau, Inc., Aurora, Ill.*

MANY FIRMS ARE FINDING THE MEN THEY NEED



andy 60-page Size! But your oremen will want to build each ntence into the day's work

Chapter I

remanship — the foreman's re- onsibility to his job, to the super- tendent, to his men, to his fellow emen, to subcontractors and the neral public; qualities which make r successful foremen 7

Chapter II

he Foreman's Place in Accident Pre- ention—planning for accident pre- ention; accident investigation; de- eloping the accident prevention rogram 15

Chapter III

he Foreman and His Men—selection nd hiring, placing and training, su- ervisory methods 23

Chapter IV

ob Planning — in relation to long ange planning, layout of the job, eceipt of materials, day-to-day lan 33

Chapter V

hysical Protection — excavation, taging and scaffolding, runways nd platforms, barricades, overhead rotection, clothing 41

Chapter VI

are, Use and Storage of Equipment — principles of selection, testing nd inspection; rigging, hand tools, upports, derricks, scaffolds, safe ractice rules, machine operators, rucks, cranes, moving equipment, oving material, air equipment, achine guards, yard storage, tool torage 51

Other American Mutual Aids to Profitable Operations

Modern, comprehensive coverage itting your special needs for work- men's compensation, contractor's ublic liability, fire, automobile, fi- elity bonds, and other forms of asualty insurance written by Amer- can Mutual and affiliates.

Regular cash dividends which have lways saved 20% or more of insur- nce costs (a big item in your oper- ting costs).

Safety recommendations which ave lowered many policyholders' ates well below average — as well s helping to avoid the delays and rouble that accidents cause.

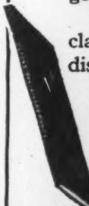
Prompt service on claims and in- uries wherever your contract may ake you.

dmitted Assets	$56,020,555.08
iabilities	48,020,239.44
urplus to Policyholders	8,000,315.64

As of December 31, 1942

. . . By Using This Practical Guide to Better Foremanship

"FOREMANSHIP" — published by American Mutual and offered as a war-time service to Industry — is helping many firms to select and train foremen from within the ranks of their present working force, by describing the essentials of a foreman's responsibility and the qualities of mind and character that make for good foremen.



You can also use it as a complete class-room guide, or basis for group discussion. You will find it so thorough and practical on construction problems that even your most experienced men will profit from it and become better fitted for their assignments.

"FOREMANSHIP" was written by men who know leadership problems in the construction industry from the ground up — and it was reviewed before publication by superintendents in charge of large construction jobs.

"FOREMANSHIP"— perhaps the most important book your business could *buy* today—is *free*. Merely fill out the coupon below, attach it to your letterhead, and mail to American Mutual Liability Insurance Co., Dept. 0-21, 142 Berkeley Street, Boston, Mass.

THERE IS AN AMERICAN MUTUAL REPRESENTATIVE NEAR YOU

AMERICAN MUTUAL
WORKS FOR YOUR SAFETY

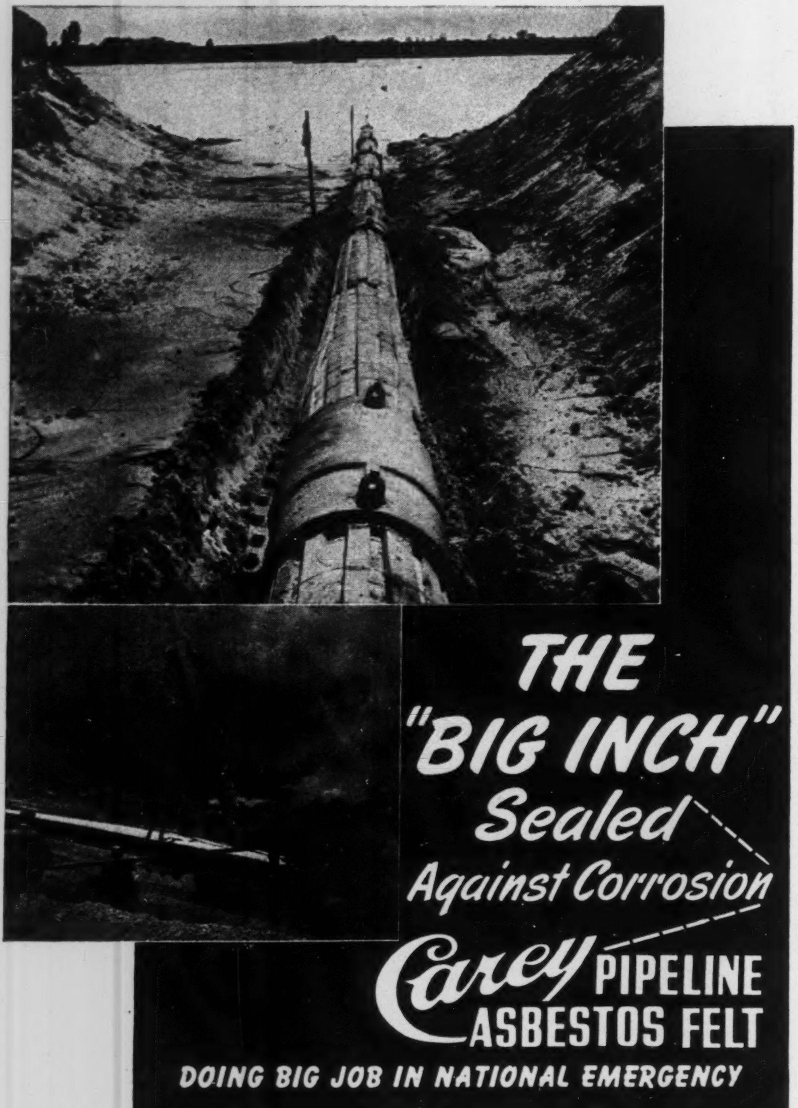
American Mutual Liability Insurance Company
Dept. 0-21, 142 Berkeley St., Boston, Mass.
Please send me FREE your book "Foremanship".

Name ....

Company ....

Address ....

ight 1943 by American Mutual Liability Insurance Company



The 24-inch War Emergency Oil Pipeline from Longview, Texas, to Norris City, Illinois, and now being laid to the East Coast, will help relieve the oil shortage to the extent of 300,000 bbl. of crude daily.

In this undertaking, the largest oil pipeline ever constructed, CAREY Asbestos Pipeline Felt is used extensively to protect the steel pipe from corrosion. A waterproofing coating is first applied and the wrapping of Carey Asbestos Felt immediately follows.

As one of the nation's leading suppliers of Asbestos, Carey controls every step in the production from the mining of its Asbestos fibre to the finished materials. If your products or processes require the use of Asbestos, call the Carey Branch Office or write Dept. 30.

CAREY ASBESTOS PRODUCTS include:

Heat Insulations, Fibre and Specialties, Prefabricated Ducts, Corrugated Roofing and Siding, Wallboard, Shingles and Siding, Sheathing, Millboard, Paper, Sweeping Compound, etc.

THE PHILIP CAREY MFG. COMPANY • Lockland, Cincinnati, Ohio
Dependable Products Since 1873
IN CANADA: THE PHILIP CAREY COMPANY, LTD. Office and Factory: LENNOXVILLE, P. Q.

New Engineering Books

(*Continued from p. 128*)

A START IN METEOROLOGY—By Armand Spitz. 95 pp. The Norman W. He Publishing Co., New York. $1.50.

AIR NAVIGATION FOR BEGINNERS—By S G. Lamb. 103 pp. The Norman Henley Publishing Co., New York. $1

NEW YORK PLANS FOR THE FUTURE— Cleveland Rodgers. 293 pp. Harpe Bros., New York and London. $3.

PEACE PLANS AND AMERICAN CHOICES— Arthur C. Millspaugh. 107 pp. T Brookings Institution, Washington, D $1.

MODERN OIL ENGINE PRACTICE—By Molloy. 636 pp. Chemical Publish Co., Inc., Brooklyn, N. Y. $5.

√ENGINEERING DRAWING—By Leon M. Sa 394 pp. The Ronald Press Co., N York. $2.75.

√STRESSES IN FRAMED STRUCTURES—Sec Edition. By George A. Hool and W. Kinne; revised by R. R. Zipprodt George C. Ernst. 642 pp. McGraw- Book Co., New York and London. $

KEEP 'EM CRAWLING: Earthworms at W A new Alexander Botts book. By W liam Hazlett Upson. 339 pp. Farra Rinehart, Inc., New York. $2.

THE LABOR RELATIONS ACT IN THE Co —By Herbert O. Eby. 350 pp. Harpe Bros., New York. $3.50.

Reports and Pamphlet

THE PARKING PROBLEM—A Library search. The Eno Foundation for Hi way Traffic Control, Inc., Saugatu Conn.

TRANSPORTATION SHORTAGES AFFECT A PHALT PAVEMENT DESIGN—Informati Series No. 49. The Asphalt Instit 801 Second Ave., New York.

EXPLOSIVES IN AGRICULTURE, LUMBERI FORESTRY—Atlas Powder Co., Wilmi ton, Delaware.

STEEL COLUMNS OF ROLLED WIDE FLA SECTION—By Bruce Johnston and Ll Cheney, Progress Report 1 and 2, ea 34 pp. Am. Institute of Steel Constr tion, 101 Park Ave., New York. Limi free distribution.

A. S. T. M. STANDARDS FOR CEMENT—Am ican Society for Testing Materials, S. Broad St., Philadelphia, Pa. $1.35.

A. S. T. M. SPECIFICATIONS FOR STEEL P ING MATERIALS—American Society Testing Materials, 260 S. Broad St., Ph adelphia, Pa. $1.75.

(*Continued on p. 150*)

STUDENT WELDERS
LEARN PROPER FLAME ADJUSTMENT FASTER

with this natural color oxyacetylene flame adjustment chart

*Oxyacetylene flame adjustments**

Acetylene burning in air

Strongly Carburizing Flame

Slight Excess Acetylene Flame

Neutral Flame

Oxidizing Flame

* Unretouched natural color photographs

These natural color photographs will give the student an accurate guide for adjusting the oxyacetylene flame. Correct flame adjustment is so vital to successful welding that the best manipulative skill is lost unless the flame adjustment is correct.

Compliments of
AIR REDUCTION

Student welders and "beginners" learn to make correct flame adjustments more quickly when they are guided by an Airco oxyacetylene flame-color chart. This helpful chart shows full color illustrations of the principal flames used for welding metals.

It makes it easier for the beginner to make sound, strong welds by clearly showing the appearance of the neutral flame which he will use most frequently in oxyacetylene welding.

The excess acetylene flame is also shown, as well as the oxidizing flame used for welding copper and copper alloys.

Since the first requisite to good welds is correct flame adjustment, every student welder will benefit by using this flame chart as his guide.

We will be glad to send you, without charge, as many copies of this chart as you need. Mail the coupon and please indicate the quantity you require.

AIR REDUCTION

AIRCO

60 EAST 42nd STREET, NEW YORK, N. Y.
***In Texas:* Magnolia-Airco Gas Products Co.**

AIR REDUCTION Advertising Dept.
60 East 42nd Street, New York, N. Y.

Please send ______ copies of the full color flame adjustment guide to:

Name ________________
Position ________________
Company ________________
Address ________________

LE CYLINDERS ARE PRODUCTION SLACKERS: KEEP 'EM ROLLING FOR VICTORY!

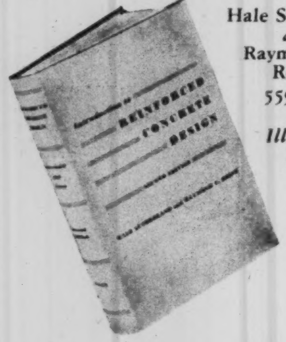
Up-to-the-Minute Data Important to Engineers!

•

Introduction to

REINFORCED CONCRETE DESIGN

By
Hale Sutherland
and
Raymond C.
Reese
559 Pages
Fully
Illustrated
$5.00



Although the first edition of this book, by Sutherland and Clifford, was considered "about the best in the field"—this second edition should prove even more satisfactory to engineers who need a good working knowledge of modern reinforced concrete design.

This book emphasizes the basic design method actually used in engineering offices. The theory is set forth and fully explained, aided by examples of practical applications. Complete designs have been made for several types of structure and present-day methods of dealing with continuous beams and rigid frames are covered in detail.

Features

The completeness of treatment—all in one volume, covering retaining walls, bridges, buildings and the theory of continuous structures is noteworthy.

The material on continuous structures, and particularly on unusual conditions in Tee-beam design, is not generally so available for ready reference.

Special emphasis is placed on the needs of young designers, with guidance in many of the common problems not usually discussed in books.

SENT ON 10-DAY APPROVAL

JOHN WILEY & SONS, INC.
440 Fourth Avenue, New York, N. Y.

Please send me a copy of Sutherland-Reese's REINFORCED CONCRETE DESIGN on ten days' approval. At the end of that time, if I decide to keep the book, I will remit $5.00 plus postage; otherwise I will return the book postpaid.

Name ....

Address ....

City and State..

Employed by ....

ENR-3-43

Reports and Pamphlets

(*Continued from p.* 148)

A.S.T.M. Standards on Mineral Aggregates — Specifications, definitions, methods of testing. American Society for Testing Materials, 260 South Broad St., Philadelphia, Pa. $1.35.

Lateral Support of Steel Columns and Struts—By C. R. Young and W. B. Dunbar. School of Engineering Research, Faculty of Applied Science and Engineering, University of Toronto.

Water Treatment with Limestone—Series No. 65, Texas Engineering Experiment Station, College Station, Texas.

Stresses in the Corner Region of Concrete Pavements—By M. G. Spangler. Bulletin 157, Iowa State College Bulletin, Ames, Iowa.

Advance Report On the Sedimentation Survey and Suspended-Matter Observations in Lake Issaqueena, Clemson, South Carolina—U. S. Dept. of Agriculture, Soil Conservation Service, Washington, D. C.

Emergency Revisions of the Asphalt Institute Construction Specifications—Asphalt Institute, 801 Second Ave., New York.

Washroom and Locker-Room Facilities—Policyholders Service Bureau, Metropolitan Life Insurance Co., New York.

Controlling Costal Sand Dunes in the Pacific Northwest—Circular No. 660, U. S. Department of Agriculture, Superintendent of Documents, Washington, D. C. 10c.

Spherical Trigonometry With Tables—By W. C. Brenke. The Dryden Press, New York. $.80.

Tests of Riveted and Welded Joints in Low-Alloy Structural Steels — University of Illinois, Urbana. 80c.

Influence Charts for Computation of Stresses in Elastic Foundations — By Nathan M. Newmark. University of Illinois, Urbana. 35c.

A Study of Chert As A Deleterious Constituent in Aggregates—By Harold S. Sweet and K. B. Woods. Research Series No. 86, Engineering Experiment Station, Purdue University, Lafayette, Indiana.

Do We Want A Federal Sales Tax?—By Charles O. Hardy. The Brookings Institution, Washington, D. C. 25c.

Research in Consolidation of Clays—By Donald W. Taylor. Massachusetts Institute of Technology, Cambridge, Mass. $1.

Building Materials and Structures—Report BMS 80, Performance Test of Floor coverings for use in Low-Cost Housing: Part 4 (15c.); BMS 88, Recommended

(*Continued on p.* 152)

UNIQUE HIGHWAY BRIDGE IN OREGON

This is a unique bridge over the W
liamette River, at Oregon City, Oreg
The steel box girders and other p
of the bridge were encased
"GUNITE".

* * * * * * * * *

Many new bridges have been built,
many old bridges have been made
good as new with "GUNITE". See
Bulletin 2200.

The "CEMENT GUN" can be boug
by anyone, and used without restrictio

CEMENT GUN COMPAN
Manufacturers of the "CEMENT GUN"
ALLENTOWN, PENNSYLVANIA

WE ARE ALSO "GUNITE" CONTRACTORS
LET US BID ON YOUR WORK

"TO ECONOMIZE—GALVANIZE AT ENTERPRISE

We **can give you 24-hour service . . . on most orders of most sizes!**

FINEST QUALITY WORK

ENTERPRISE GALVANIZING COMPANY

2500 E. Cumberland St., Phila., P

BIG HAUL
FOR UNCLE SAM

Selectively cut under scientific woods management, this forest harvest goes to war — leaving the vigorous younger growth for continuous harvests to come. Harvesting matured trees accelerates healthy forest growth.

The Forest Fights on Many Fronts

Designed and Prefabricated by McKeown Brothers Co., Chicago

And on the home front, wood has taken over metal's peacetime tasks in thousands of heavy timber structures. This 111-foot-span municipal pier in Chicago is a typical example of how the TECO-RING Connector System has made it possible to employ timber as a heavy engineering material . . . and to meet fully all requirements of speed, strength and economy. Write for our literature today

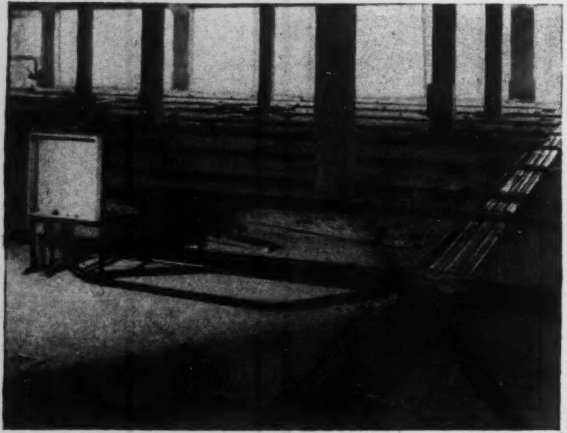
The TECO Ring Connector spreads the load on a timber joint over practically the entire cross-section of the wood . . . brings the full structural strength of lumber into play.

Timber ENGINEERING COMPANY

WASHINGTON, D. C. PORTLAND, OREGON

FOR UNDERFLOOR ELECTRICAL DISTRIBUTION

General Electric offers two types of underfloor wiring. Both give almost unbelievable flexibility to shops, factories, offices, etc. Electrical outlets can be added later as they are needed.

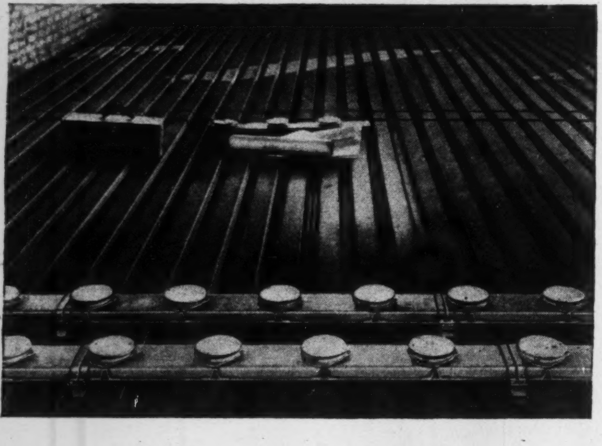


Use G-E FIBERDUCT With Masonry and Wood Type Construction

G-E Fiberduct installation.

Use G-E Q-FLOOR WIRING With Robertson Q-Floors

G-E Q-Floor Wiring installation.



Send the coupon for catalogs giving further information on these flexible underfloor wiring systems.

General Electric Company
Section C334-113
Appliance and Merchandise Department
Bridgeport, Conn.
Sirs: Please send me: ☐ The G-E Fiberduct Catalog
☐ The G-E Q-Floor Wiring Catalog
Name
Address
City State

GENERAL ELECTRIC

(*Continued from p. 150*)

Building Code Requirements for Dwelling Construction (20c.); BMS Structural Properties of "PHC" Pref ricated Wood-Frame Constructions Walls, Floors, and Roofs (15c.); B 92, Fire-Resistance Classifications Building Constructions (25c.); BMS Accumulation of Moisture in Walls Frame Construction During Winter E posure (10c.); BMS 94, Water Perme bility and Weathering Resistance Stucco-Faced, Gunite-Faced, and "K Concrete-Unit" Walls (10c.). Super tendent of Documents, Washingt D. C.

Concrete for Railways—Vol. 6, No. Portland Cement Association, 33 W Grand Ave., Chicago, Illinois.

1942 Laws Bulletin—No. 2. A Digest New Legislation Affecting High Users. National Highway Users Conf ence, National Press Building, Washi ton, D. C.

Flood-Plain Zoning — California St Planning Board, 631 J Street, Sac mento.

Calulo De Distribucion De Agua P Edificios—Alberto E. Olivares, Revis Del Colegio De Ingenieros De Venezue Caracas, Venezuela.

Interstate Sanitation Commission— annual report 1942. New York, New Je sey and Connecticut. 60 Hudson St., N York.

Pittsburgh, Pa.—Annual report of the Ci Planning Commission 1942.

Syracuse, N. Y.—Annual report of the D partment of Engineering 1942.

Evaporation from Lakes and Reservo —Minnesota Resources Commission, S Paul, Minn. Limited number of copi available for free distribution.

Saint Louis After World War II — Ci Planning Commission, Saint Louis, M

Charleston, S. C.—1941 Year Book.

Summer Comfort Factors as Influenc By Thermal Properties of Buildi Materials—Research Study No. 11. Jo B. Pierce Foundation, 40 W. 40th S New York, N. Y.

Postwar Economic Development o Alaska — National Resources Plann Board, Federal Courthouse, Portlan Ore.

Shelter Against Aerial Bombardment— By Theodore Crane. The Connectic State Defense Council, Hartford, Con

Passive Protection for Industri Plants—U. S. Office of Civilian Defens Washington, D. C.

The Forest Fights—Timber Engineeri Company, Inc., Washington, D. C.

CK FACTS ON TRANSITE SEWER PIPE

INSTALLATION . . . Transite's long lengths reduce the number of joints needed in the line . . . its light weight permits easier, faster, more economical handling.

INFILTRATION . . . Fewer, tighter joints minimize leakage, cutting down on the load at the disposal plant.

DELIVERY CAPACITY . . . This advantage of Transite Pipe frequently permits smaller pipe or flatter grades, resulting in shallower trenches.

ILABLE BOTH FOR FORCE MAINS AND GRAVITY LINES . . . Complete information is given in brochure TR-21A. And for details on lower-cost water transportation, send for Transite Water Pipe Brochure TR-11A. Johns-Manville, 22 East 40th Street, New York, N. Y.

ENGINEERING DATA

GRAVITY TYPE

Sizes: Class 1— 4" to 36"
Class 2—10" to 36"
Class 3—10" to 36"
Class 4—18" to 36"

Crushing Strengths:
A.S.T.M. 3-edge bearing test method

Pipe size inches	Lb. per linear ft. Class 1	Class 2	Class 3	Class 4
4	4125	....	....	....
5	3350	....	....	....
6	2880	....	....	....
8	3100	....	....	....
10	2580	3690	4920	....
12	2370	3850	5100	....
14	2200	3920	5150	....
16	2120	4050	5280	....
18	2030	4140	5360	6340
20	2290	4280	5850	7100
24	2340	4550	7050	8600
30	2980	5000	8180	10450
36	3500	5400	9700	12300

Friction Coefficient (Kutter's); n=.010

PRESSURE TYPE

Sizes: 3" to 36"

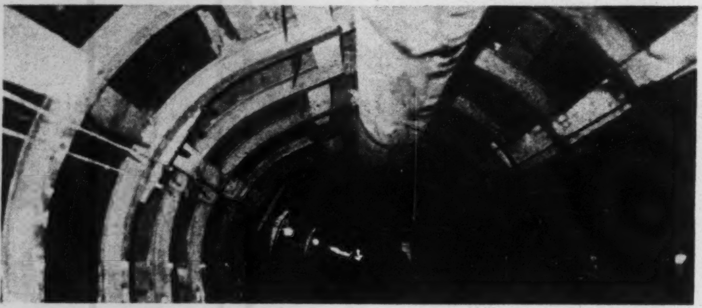
Pressure classes: Class 50— 50 lbs. per sq. in.
Class 100—100 lbs. per sq. in.
Class 150—150 lbs. per sq. in.
Class 200—200 lbs. per sq. in.

Friction Coefficient (Williams & Hazen): C=140

JM Johns-Manville

TRANSITE *SEWER* PIPE

An Asbestos Product



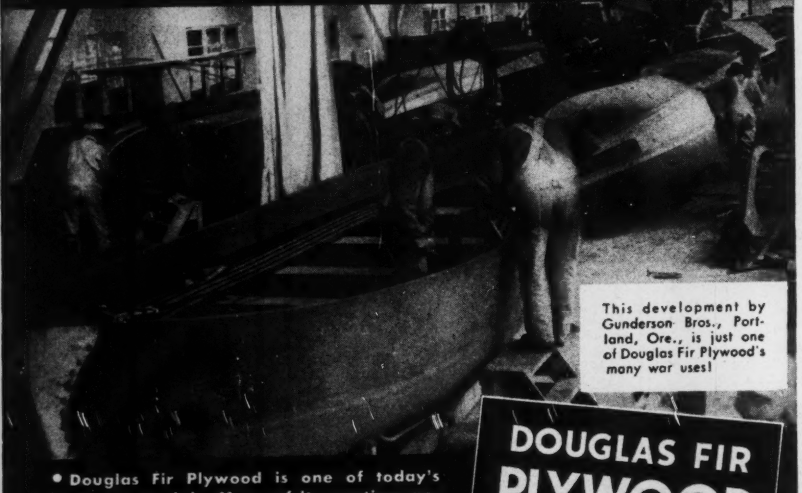
Safety . . . Speed . . . Economy!

COMMERCIAL LINER PLATES AND SUPPORTS

• Make it a point to employ COMMERCIAL Liners and Supports. Provide safety, speed the work, and assure genuine economy. For any size tunnel—any ground conditions — there is a size and type of COMMERCIAL Plate or Support to meet your requirements. Write to us today—we will be glad to furnish details on sizes, types, prices, deliveries, etc. . . .

THE COMMERCIAL SHEARING & STAMPING CO.
YOUNGSTOWN OHIO

Douglas Fir Plywood builds lighter, safer lifeboats!



This development by Gunderson Bros., Portland, Ore., is just one of Douglas Fir Plywood's many war uses!

• Douglas Fir Plywood is one of today's busiest materials. Many of its wartime applications are shown photographically in our new War Use Folder. Write for your free copy now. Discover how Douglas Fir Plywood's present jobs will — after Victory — make this Miracle Wood more useful to you than ever before. Douglas Fir Plywood Association, Tacoma Bldg., Tacoma, Wash.

DOUGLAS FIR PLYWOOD
•
Real Lumber
MADE LARGER, LIGHTER
SPLIT-PROOF
STRONGER

STRONGER PER POUND THAN STEEL!

MANUFACTURERS' ACTIVITIES

Fred C. Smith has been appoin chief metallurgist for Tube Turns. His sponsibilities include supervision of

raw and finished m terials inspecti forging operatio heat treating a metallurgical r search and servi Since 1936, M Smith was field m allurgist for Car gie-Illinois Steel C at Chicago, and pri to that connecti was plant metallurgist for the Intern tional Harvester Co. at their Fort Way and Chicago plants. He is a former vi president of the American Society f Metals.

G. C. Clough, formerly general supe intendent for Fred T. Ley & Co., In of New York, has become plant man ger for the New England Lime Co. Adams, Mass.

Some 2,500 employees and friend witnessed a ceremony commemorati the award of the Navy E to the Kans City plant of the Butler Manufacturi Co. last month. The presentation w made by Col. Malcolm Elliott, Arm Engineers Corps, and Lieut. Commande Nathan Young, Officer Procurement Se tion of the Navy. A dramatic sketch wa broadcast over a half dozen radio sta tions, the sketch being entitled—"Th Lines That Form Shall Never Brea Because of Things We Failed to Make," which simulated the use of the com pany's war products in combat servic around the globe. The Butler compan manufactures steel landing mats fo airfield runways, steel hangars, livin quarters, machine shops, supply ware houses, in fact every type of building needed for a complete airdrome is produced for both the Army and Navy. The company manufactures specially designed truck tanks and trailer tank refueling units.

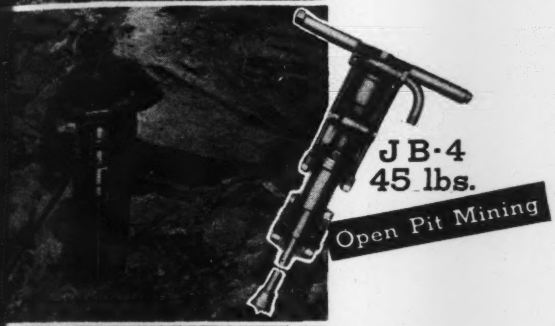
Alexander McKelvie, secretary o the Canadian Sumner Iron Works, Ltd. died in Vancouver recently. Mr. McKelvie was 66.

Wilfred C. Shattuck has been appointed sales manager for Wickwire Spencer Steel Co., with headquarters i their New York offices. Mr. Shattuck was graduated in 1924 from Brown Uni

More Holes Per Shift With Ingersoll-Rand JACKHAMERS

JB-30
30 lbs.
Defense Plants

JA-35
35 lbs.
Coal Mining

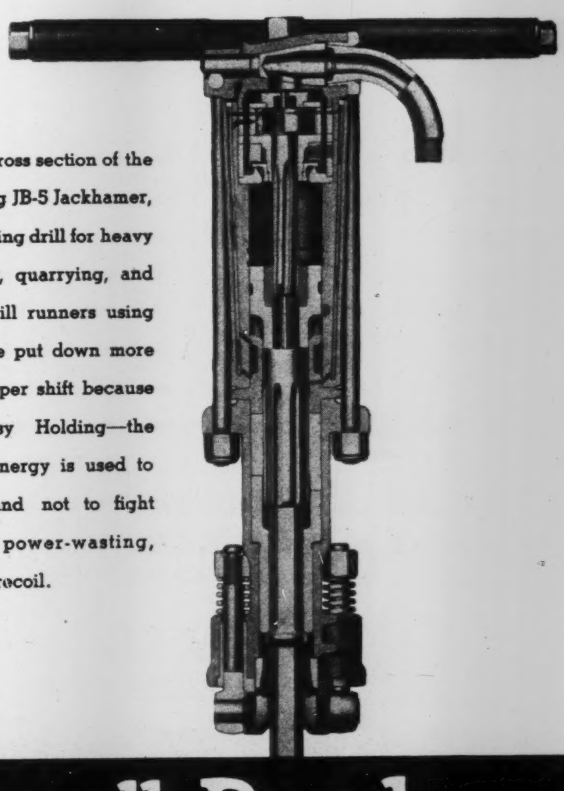


JB-5
55 lbs.
Strategic Roads

X-59
72 lbs.
Dam Sites

Each of these Jackhamers will do a variety of jobs, but each of them will do some one specific class of work better than any other size or type of drill. This enables users of Ingersoll-Rand Jackhamers to select the proper machine for their particular drilling problem—and drill more holes per shift.

KEEP 'EM DRILLING
Ask your supplier for an oil that meets I-R Specification 433—the new rock drill lubricant developed by Ingersoll-Rand



***Right*—A cross section of the Easy-Holding JB-5 Jackhamer, the outstanding drill for heavy construction, quarrying, and mining. Drill runners using this machine put down more feet of hole per shift because of its Easy Holding—the operator's energy is used to cut rock and not to fight fatiguing, power-wasting, destructive recoil.**

Ingersoll-Rand
11 BROADWAY, NEW YORK CITY

Branches or Distributors in Principal cities the world over.

Chicago
Cincinnati
Cleveland
Dallas
Denver

Detroit
Duluth
El Paso
Hartford
Houston

Kansas City
Knoxville
Los Angeles
Newark
New Orleans
New York

Philadelphia
Picher
Pittsburgh
Pottsville
Salt Lake City
San Francisco

Scranton
Seattle
St. Louis
Tulsa
Washington

5-180

Mexico Havana Rio de Janeiro Lima London Paris Madrid Lisbon Melbourne Calcutta Johannesburg and many others

"Straddledeck" TRAILERS

meet
SPECIAL NEEDS

Bulky, cumbersome machinery, and of late heavy pieces of defense equipment must be moved from place to place.

In some localities, where low headroom is encountered, this type of Rogers Trailer is used extensively.

Large machines, with crawler treads "straddle" the girders thus lowering the overall height by several inches, a definite advantage also in handling many kinds of equipment.

RAYMOND PILE

ROGERS TRAILERS

ROGERS BROTHERS CORP., ALBION, PENNA.

DOBBIE FOUNDRY & MACHINE CO.
NIAGARA FALLS, N. Y.

SAFETY HOOKS

Capacities
from 3
to 20 tons

DERRICKS • WINCHES • SHEAVES

The
PHOENIX BRIDGE CO.

BRIDGES and BUILDINGS

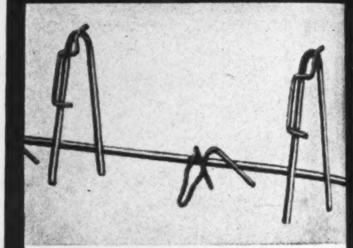
General Office and Works
Phoenixville, Pa.

District Offices
New York, N.Y. Boston, Mass.
Washington, D. C.

versity with the degree of Ph. B. H was connected with the Wickwi Spencer Co. from 1925 to 1940, havin resigned to join the John A. Roebling Sons Co., at Trenton, N. J. With th Roebling organization he was manag of sales in their round wire, flat wi and specialties division, Trenton. H returns to Wickwire-Spencer after tw years with John A. Roebling's So Company.

Top-Ranking Seniors in America high schools and preparatory schoo who aspire to an engineering care have been invited to apply for te scholarships, each valued at $3,420 t be awarded this spring by the Westing house Electric & Manufacturing Co Pittsburgh, Pa. An opportunity will b afforded those selected to obtain clas room work at the Carnegie Institute o Technology and actual experience i shops and laboratories of the company Applicants are required to be young me with scholastic records which will plac them in the highest 15 percent of thei graduating class.

John B. Klumpp has been elected t the board of directors of the America Meter Co. Mr. Klumpp brings to th American Meter Co. directorate experi ence gained in a long and distinguishe career in the utility field, being recog nized as one of the outstanding gas engi



Eliminate TIE WIRES
Save Material, Time and Labor

UNION STEEL
Combination Snap-In Slab
Spacer and Hi-Chair

● These US 417 units permit "factory production" on the job. They greatly speed up placement of concrete reinforcement. They eliminate all tie wires. Can be used on any reinforced concrete construction . . . especially recommended for bridges, igloos, war plants, etc. . . . comply with Federal Specifications.

SPECIALTIES: Union Steel offers a wide variety of construction specialties. Write for catalog. See Sweet's, Sec. 3-52.

UNION STEEL
PRODUCTS CO.
417 Pine st. • Albion, Mich.

SEE OUR CATALOG IN SWEET'S

Service

...keynote for the duration

Crucial months lie ahead. More work will be demanded of your Cummins Dependable Diesels than ever before. New engines will be hard to get for reasons which you well understand. This simply means that your present Cummins Diesels must carry the load . . . *and they will carry the load providing you make service your keynote for the duration.*

This doesn't mean, however, that you will have to pamper your Cummins Diesels. They were built for tough jobs and 24-hour duty and they will give you this kind of performance indefinitely if you will observe these cardinal rules: **(1)** Keep your engines clean; **(2)** Don't tinker; **(3)** Adopt a regular schedule of preventive maintenance; **(4)** Follow the recommendations in the Operator's Instruction Manual; **(5)** When in doubt, always consult your Cummins Dealer. CUMMINS ENGINE COMPANY, Columbus, Indiana.

SERVICE
SERVICE
SERVICE
Model H Series
OPERATORS INSTRUCTION
REVIEW MANUAL

CUMMINS *Dependable* **DIESELS**

ARMY
NAVY

Illustrated at the left is the 150 hp. Model H Cummins Dependable Diesel. This engine's economy, stamina and flexibility have been proved in all types of construction and material handling operations, in trucks, shovels, compressors, etc. With the Models A, HS (supercharged) and L, it gives you a complete line of dependable power for CHEAPER YARDAGE *—33 to 250 hp.*

SCRATCH
~~WASTE~~
~~MOTION~~
on 8
Construction Jobs
with Mall TRADE MARK
PORTABLE
POWER UNIT

★ ***Dependable Low-Cost Power Wheeled Anywhere On The Job***

- ★ **For Concrete Vibrating, Wet Wall Rubbing, Sanding, Wire Brushing, Drilling, Sawing with Circular Saw, Pumping and Sharpening Tools**
- ★ **8 quickly interchangeable tools for these tasks can be changed as easily as bits in a brace**
- ★ **Eliminates time lost installing electric power on the job**
- ★ **Eliminates need for generator or compressor set**
- ★ **Saves time, labor, material and improves workmanship**

Variable speed gasoline engine starts easily, runs all day on 1½ to 2 gallons of gasoline, requires little attention and little maintenance. Variable engine speeds 1000 to 3000 r.p.m. Countershaft speeds 3000 to 7000 r.p.m.

Mall TRADE MARK
PORTABLE POWER TOOLS

Available for Victory Construction. Full details upon request.

MALL TOOL COMPANY
7730 SOUTH CHICAGO AVE.
CHICAGO ILLINOIS

manager. He was graduated from Cathedral Latin High School in Cleveland in 1922 and started with Steel and Tubes during that same year in the operating department. From the operating department he was transferred to the sales department and was successively salesman, Central District sales manager and division sales manager.

THE COVETED ARMY-NAVY "E" award emblems were conferred upon several hundred employees of the Ilg Electric Ventilating Co., Chicago, in impressive between-shift ceremonies, at the plant on Feb. 11. The picture at left shows Mrs. Minnie Schuster (selected as typical Ilg woman), receiving congratulations from Major Lauris Eek of the U. S. Army Air Force, Chicago, who made the presentation of pins to Ilg employees.

SIGHT LIGHT CORP., Deep River, Conn., has been awarded an Army-Navy "E" for meritorious service on wire production equipment. Lieut. John D. Lodge, USNR, was master of ceremonies and presentation was made by Rear Admiral Wat T. Cluverius, retired. Earl L. Canfield accepted the award for the company.

A. F. MCGRAW has been made general sales manager of the Tractor Div. of the Allis-Chalmers Mfg. Co., and R. A. Crosby, who has been temporarily loaned to the salvage section of the War Production Board, will become advertising manager.

RALPH G. DETMER, general manager of the American Frog & Switch Co., Hamilton, Ohio, has been elected vice-president of that concern, which is a subsidiary of the Taylor-Wharton Iron & Steel Co. Mr. Detmer studied civil engineering at Ohio Mechanics Institute and in 1914 he joined the Weir Frog Co. as a draftsman, and became chief draftsman in 1920. A year later he entered the employ of the American Frog & Switch Co. as chief draftsman. He was promoted to chief engineer in 1923, to general superintendent in 1928, and to general manager in 1930.

WAR BONDS TO the extent of $650 have been awarded in a nationwide contest designed to reveal to industry the most outstanding methods of salvaging and maintaining machinery under wartime conditions. Sponsored by Metallizing Engineering Co., Inc., Long Island City, N. Y., this is the second of a series of similar contests open to users of any

GRIFFI
R I F F I N

WELLPOI
SYSTEM

JETTIN
PUMPS

FOR SALE RENT

Prompt Shipmen

Send for our New 60
illustrated catalog
"GRIFFIN POINTED WELLP
FACTS" chock full of latest
mation on Wellpoint System
dewatering, emergency and
manent water supply sys
also information on pres
pumps and data for jetting

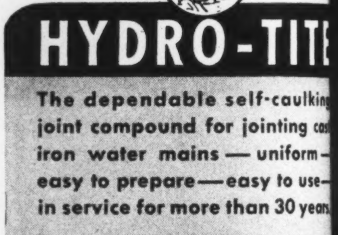
GRIFFIN WELLPOINT CO
881 EAST 141st ST. • NEW YORK,
Phones: MElrose 5-7704-5-6

HYDRO-TIT

The dependable self-caulkin joint compound for jointing cas iron water mains — uniform— easy to prepare—easy to use— in service for more than 30 years

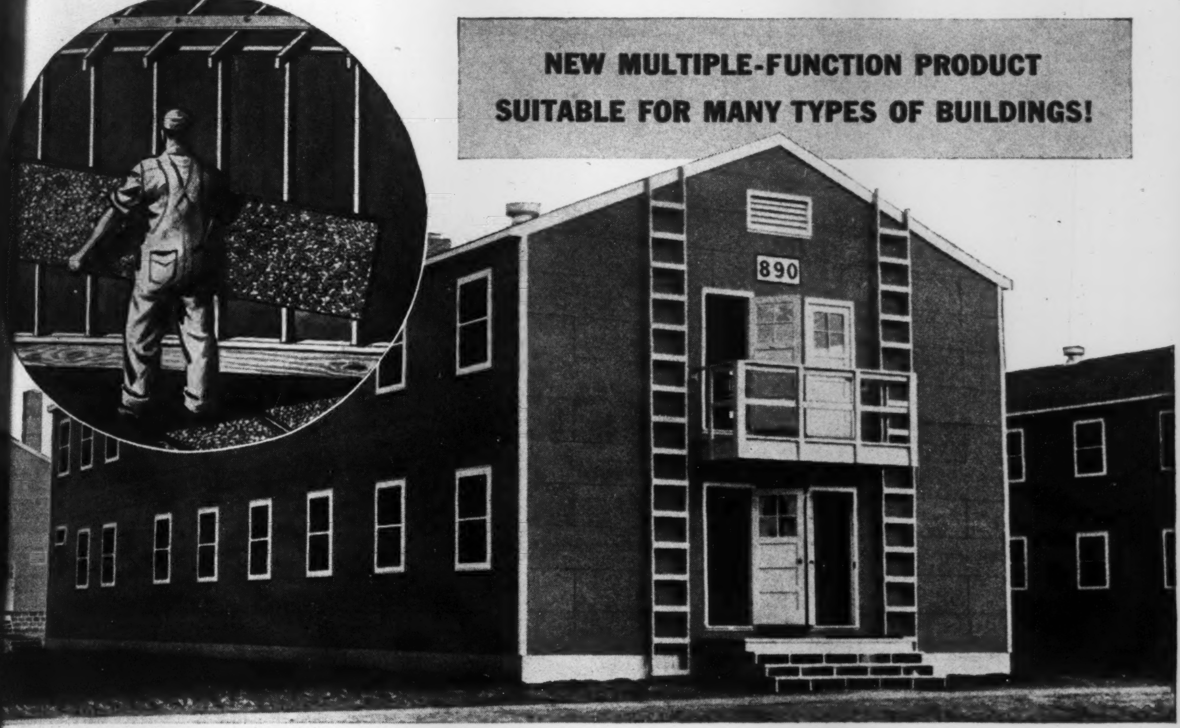
HYDRAULIC DEVELOPMEN
CORPORATION
50 Church St., New York, N. Y

FIBREX — A sanitary packin used like braided jute—will no breed bacteria — 30% lighte than jute — put up in 60 pound reels.



ow ONE Material Does 3 Jobs...

SAVES CRITICAL MATERIALS, TIME, AND LABOR!



NEW MULTIPLE-FUNCTION PRODUCT SUITABLE FOR MANY TYPES OF BUILDINGS!

Celotex Celo-Siding Combines Sheathing, Insulation, and Permanent Exterior Finish

OR HANGARS and machine shops, dormitories or barracks, cabins, d small factories, an exterior wall multiple-function Celo-Siding eans a substantial saving in critical eathing lumber and nails, faster mpletion, and less labor. All these vings are possible because Celo-iding does three jobs—combines sheathing, insulation, and permanent exterior finish!

Celo-Siding is nailed directly to studding, eliminating the need for sheathing lumber. Each unit is composed of cane fibre board, coated on all sides with asphalt compound, with an extra coating on the weather surface, into which are pressed crushed mineral granules in brown, buff, or green.

Units are 7/8″ thick, and 2′x 8′ or 4′x 8′ in size. 2′x 8′ has T&G joints on long edges. 4′x 8′ has square edges all around. Each suitable for horizontal or vertical application. All joints are sealed with caulking compound. Mail the coupon for complete facts.

CELOTEX

REG. U. S. PAT. OFF.

ROOFING • INSULATING BOARD
ROCK WOOL • GYPSUM WALLBOARD • LATH
PLASTER • ACOUSTICAL PRODUCTS

HE CELOTEX CORPORATION • CHICAGO

THE CELOTEX CORPORATION, ENR 3-11-43
CHICAGO, ILLINOIS

Please send complete information and samples on new multiple-function Celo-Siding.

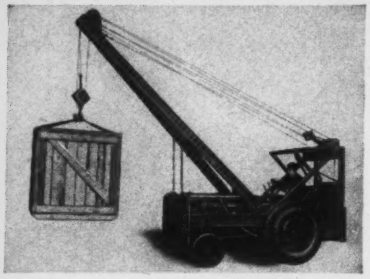
Name ....
Address ....
City ....
County .... *State* ....

MERCER
"THE NAME THAT CARRIES WEIGHT"

WAR-PRODUCTION HANDLING EQUIPMENT

GANTRY AND WHEEL-TRACTOR CRANES
TRAILER TRUCKS
LIFT TRUCKS
CARTS
ELEVATORS
CONVEYORS

Illustrated, informative literature is available on all Mercer material handling equipment. State your problem. Our engineers will make recommendations for a prompt and practical solution.



Shown above . . . Mercer Crane fitted with pneumatic tires. Models so equipped travel over any kind of surface; do their job with speed and efficiency. An example of Mercer designing and Mercer construction. Our complete engineering facilities are at your service!

MERCER ENGINEERING WORKS, INC.
30 CHURCH STREET, NEW YORK—Works: CLIFTON (ALLWOOD), N.J.

DAVEY
Truck Compressors
Serve Dual Purpose
DO MORE JOBS AT LOWER COST.

• Not only do these trucks serve as mobile units for compressed air service but with their split propeller power take-off you can use the same truck power unit for other jobs.

Here is a dual purpose unit illustrated which serves as a hoist and also carries an air compressor for general utility, operated through the Split Propeller Power Take-off.

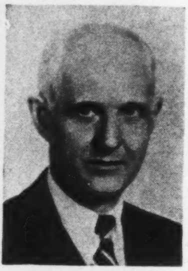
Keep your truck power busy all of the time by equipping it with a Davey power take-off unit. This power take-off can be mounted on your present truck or included on your new truck equipment.

Davey also builds a full line of heavy duty portable and industrial compressors, pneumatic saws, and pole hole diggers.

DAVEY COMPRESSOR CO.
Power Take-Off Division
KENT . . . OHIO . . . U.S.A.

metal spraying equipment in the Uni
States and Canada.

Charles A. Crane, for many ye
identified with the construction field,
rejoined Templeton, Kenly & Co., ma



facturers of le
screw and hydrau
jacks, as assistant
the president.
first job after gra
ating from the C
cago Manual Tra
ing School in 18
was the problem
building the fi
Simplex lever ja
for the Templet
Company, who at that time were locat
in a small shop on East Ontario St.,
Chicago.

W. McKean White, Jr., vice-preside
White Mfg. Co., Elkhart, Inc., has be
given leave of absence and is now
2nd Lieutenant in the U. S. Army A
Corps. As of Feb. 12, he was statione
at Wendover Field, Utah, as assista
supply and engineering officer of th
384th Bombardment Group. Merritt
King has joined the White Mfg. Co.
assistant to the president. Mr. King ha
had extensive experience in the co
struction machinery industry.

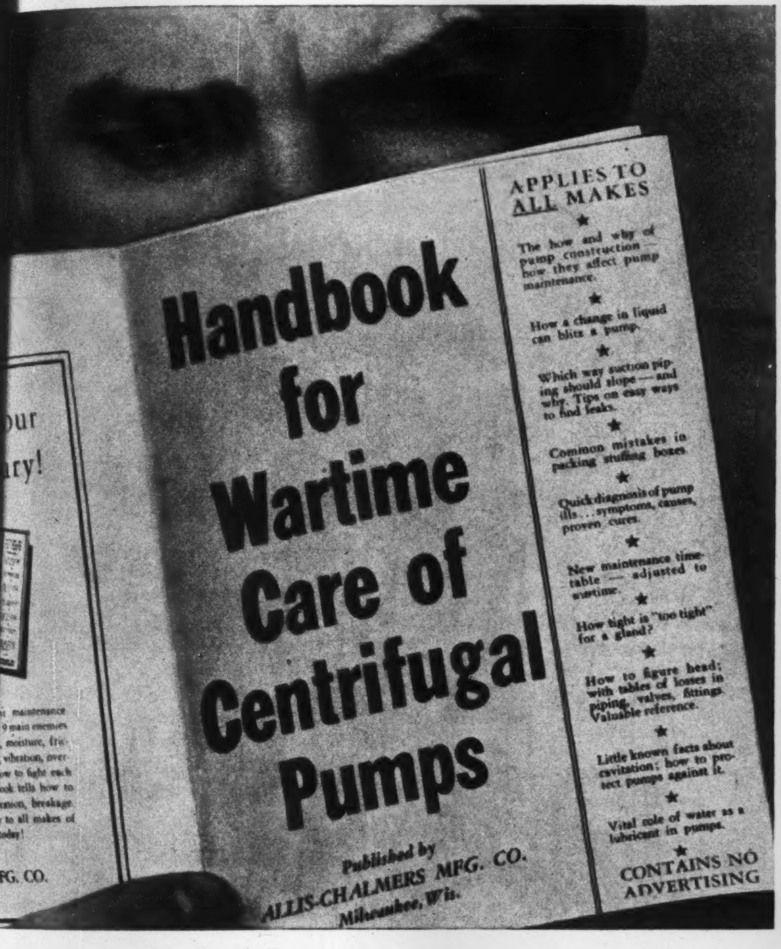
L. P. Niessen, widely known adverti
ing man and head of Cutler-Hamme
Inc., Milwaukee, Wis., advertising de
partment, has been elected a director o
the Milwaukee Association of Industria
Advertisers.

Southern Pine Association officer
elected for the ensuing year are as fo
lows: Paul T. Sanderson, Trinity, Texas
was elected president; W. B. McNeal
Hardeeville, S. C., first vice-president
Quincy T. Hardtner, Urania, La., 2n
vice-president; W. T. Neal, Brewton
Ala., treasurer; and H. C. Berckes, New
Orleans, secretary-manager. The direc
tors adopted resolutions of regret and
esteem in tribute to the members of the
late A. J. Peavy, of Shreveport, La., and
Charles Green, Laurel, Miss., who for so
many years were leaders in the Southern
Pine industry, and whose deaths occurred
since the last regular meeting of the
Board of Directors.

Earl L. Young, vice-president in
charge of production, Laminated Shim
Co., Inc., Glenbrook, Conn., has retired.
Mr. Young had been with the company
22 years, having entered the organization
on February 1, 1920. The company
manufactures shims and shim stock, and
An-cor-Lox self-locking nuts.

C. L. Cummins, founder-president of
the Cummins Engine Co. of Columbus

Required Reading!


Handbook for Wartime Care of Centrifugal Pumps
Published by ALLIS-CHALMERS MFG. CO. Milwaukee, Wis.
APPLIES TO ALL MAKES
The how and why of pump construction — how they affect pump maintenance.
How a change in liquid can blitz a pump.
Which way suction piping should slope — and why. Tips on easy ways to find leaks.
Common mistakes in packing stuffing boxes.
Quick diagnosis of pump ills . . . symptoms, causes, proven cures.
New maintenance timetable — adjusted to wartime.
How tight is "too tight" for a gland?
How to figure head; with tables of losses in piping, valves, fittings. Valuable reference.
Little known facts about cavitation; how to protect pumps against it.
Vital role of water as a lubricant in pumps.
CONTAINS NO ADVERTISING

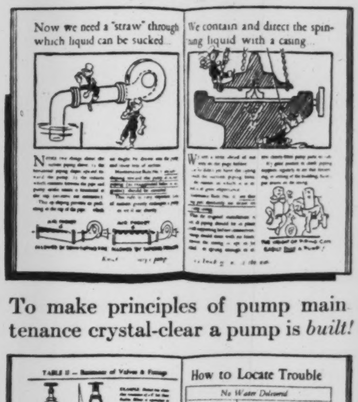
our copy is *free!* Allis-Chalmers will gladly mail copies “Handbook for Wartime Care of Centrifugal Pumps” *free of arge.* It applies to *all* makes — contains no advertising. Use it make present pumps last — and when you *do* need new pumps, k into the extra efficiency and long life built into Allis-Chalmers ntrifugal pumps . . . all types for every purpose.

ALLIS-CHALMERS
MILWAUKEE

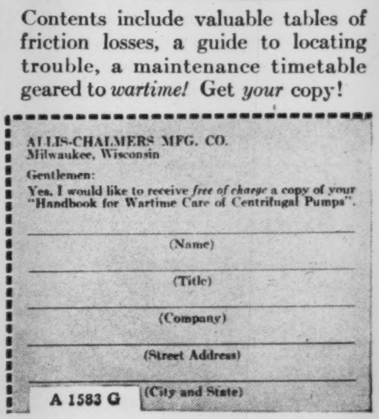
AC
WE WORK FOR VICTORY
WE PLAN FOR PEACE

PUMPS NOW DO 4 TIMES THEIR NORMAL WORK - NEED THE FINER KIND OF CARE SET FORTH IN ALLIS-CHALMERS' NEW HANDBOOK!

EVERY EXECUTIVE, engineer and operating man should have a copy of this important new publication in his technical library. Pumps doing wartime work (8700 instead of 1800 hours a year) need *wartime care!*


Now we need a "straw" through which liquid can be sucked...
We contain and direct the spinning liquid with a casing...

To make principles of pump maintenance crystal-clear a pump is *built!*


How to Locate Trouble
No Water Delivered
Not Enough Water Delivered

Contents include valuable tables of friction losses, a guide to locating trouble, a maintenance timetable geared to *wartime!* Get *your* copy!

ALLIS-CHALMERS MFG. CO.
Milwaukee, Wisconsin

Gentlemen:
Yes, I would like to receive *free of charge* a copy of your "Handbook for Wartime Care of Centrifugal Pumps".

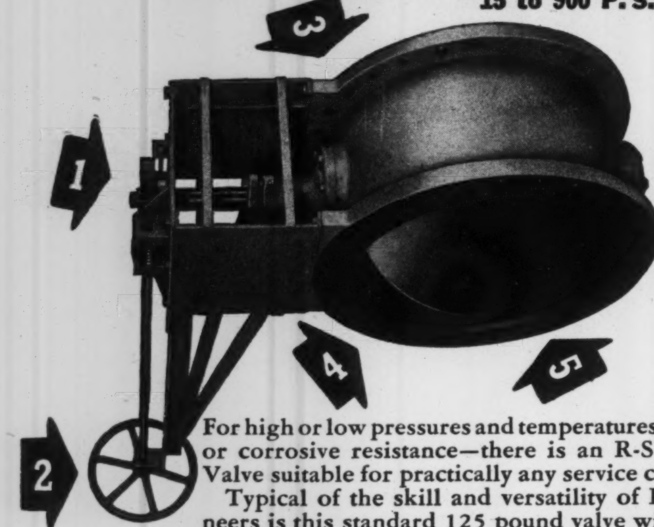
(Name)
(Title)
(Company)
(Street Address)
(City and State)

A 1583 G

Simplify

Control and Shut-Off for Inaccessible Locations

15 to 900 P. S. I.

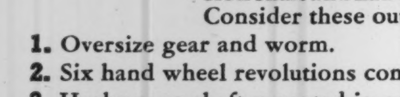


For high or low pressures and temperatures, abrasive or corrosive resistance—there is an R-S Butterfly Valve suitable for practically any service condition.

Typical of the skill and versatility of R-S Engineers is this standard 125 pound valve with extension shaft and hand wheel for inaccessible locations. Consider these outstanding features.

1. Oversize gear and worm.
2. Six hand wheel revolutions complete full vane movement.
3. Husky vane shaft mounted in grease-sealed stuffing box.
4. Body and vane can be cast of special R-S "A" or "Abrasive" metal for extra-long wear.
5. Beveled vane is precision machined—seats wedge-tight against valve body. Constructed to any A.S.M.E. dimensional standard. Sizes to 72-inches.

BUTTERFLY VALVE DIVISION
R-S PRODUCTS CORPORATION
116 Berkley Street • Philadelphia, Penna.



A SUBSTITUTE FOR STEEL!

R-S Engineers have developed special metals for resistance against heat, abrasion and corrosion. For example, R-S "H" Metal is an alloy semi-steel that machines like cast iron. Tensile up to 50,000 p.s.i. Withstands high pressures and penetration of steam and gases up to 1000°F. Stress relieved up to 1400°F.

Request detailed information and Catalog No. 10-B.

R-S Streamlined BUTTERFLY VALVES

Ind., manufacturers of diesel engi has been appointed executive consult on Diesel Engine Production to the W Production Board, with headquarters Washington.

L. G. Bean has been made vice-pre dent in charge of engineering a sales for the Bristol Co., Waterbur Conn., manufacturers of automatic control and recording instruments. His former position was that of vice-president and general sales manager, which he had held since 1939. Mr. Bean was graduated from Worcester Polytechnic Institute with a degree of B.Sc. in 1920. In 1921 became district manager of the co pany's Boston District; in 1925 he w made Chicago District Manager; and 1930 he returned to Waterbury as assi ant chief engineer. In 1935 he was a pointed sales manager, later becomi vice-president and then appointed ge eral sales manager.

Harry E. Beane has been named Sal Manager of the Bristol Co. He joine the Bristol Sales Engineering Organiz tion in 1930, and in 1935 was appointed district manager of the company's Birmingham, Ala., office. In 1930 he became district manager of the Pittsburgh District, and in 1936 was promoted to Field Sales Manager to supervise activities of the company's branch factories at Chi cago, Akron, and San Francisco, and t supervise the work of the company's di trict managers, sales engineers, and serv ice engineers distributed throughout th country.

E. L. Stilson has been named assistan sales manager. Since 1940, Mr. Stilso has been associated with the Field Engi neering Department with headquarter at Waterbury.

The Masonite Corp., Laurel, Miss was awarded the Army-Navy "E" Pro duction Award on Feb. 24. The cere monies in connection with the awar were broadcast over a nation-wid hookup over the blue network.

James Griswold Blunt, assistant t James E. Davenport, vice-president i charge of engineering of the America Locomotive Company, died in Schene tady, N. Y., on February 15. Mr. Blun was 74 years old. Many devices for mee

*Another 6 Months
of Star
Performance
WAR PRODUCTION
EXCELLENCE WILL BRING
POST WAR PLUS VALUE

PULLING WIRES FOR PEACE!

Mile after mile of wires are being processed to speed the war effort and to hasten peace.

Day and night, the finest of steel passes through scientifically-controlled patenting furnaces, steaming vats that clean and coat, and baking ovens that dry and degasify. With unrivalled skill, through dies of jewel-like precision, it is drawn down to wire.

With scarcely a pause, spools of it in great numbers are cradled in the awesome whirr of robot-like stranding and laying machines. There, just as steadily as they were drawn down, wires are laid up again, first into strands and then into rope. In each process, strength is gained to supply tough, flexing sinews for machines which multiply and quicken man's capacity ten thousandfold.

As never before, with ever-increasing skill, our craftsmen are producing tough steel tendons for fighting machines. Before there can be war machines, however, ores, oil, coal and stone must be mined. Steel and metals must be made, lumber logged, war plants constructed and fitted. Then there must be highways, seaports and airports hewn out of the earth around the globe.

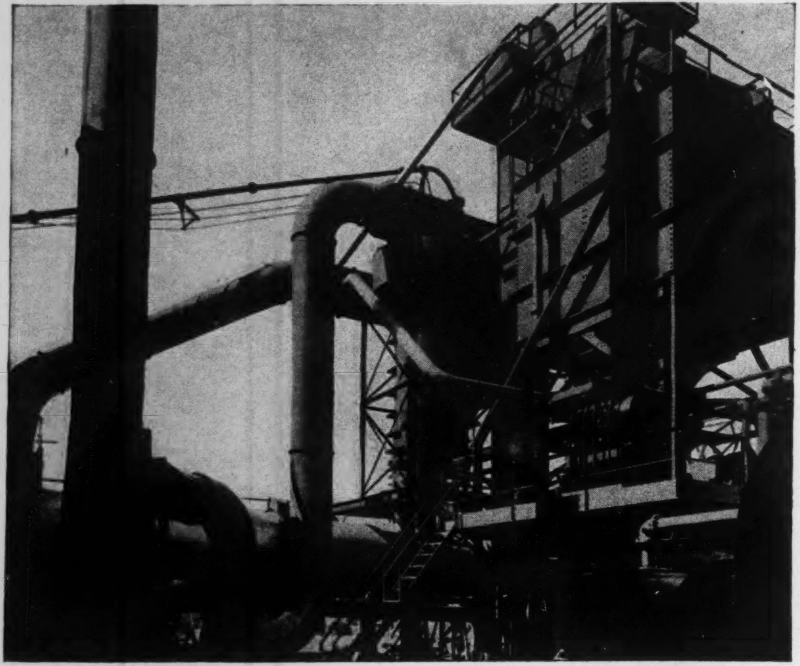
Think! Try to imagine what a limitless, hopeless, man-killing job it would be without modern wire rope to do the digging, shoveling, hoisting and countless other burdensome tasks. Then resolve to use your wire rope with great care.

UNION WIRE ROPE CORPORATION
2134 Manchester Ave., KANSAS CITY, MO.
Tulsa • Houston • Chicago • Salt Lake City • New Orleans
Monahans • Portland • Ashland, Ky. • Atlanta
C-43

SEND FOR ROPE DOPE • Tells how to make wire rope last longer—how to handle and install it—how to socket or splice—and a wealth of other helpful information. Engineering information supplied without obligation.

WHEN YOU NEED PREFORMED WIRE ROPE
SPECIFY **union-formed**

UNION WIRE CORP ROPE
union
Wire Rope
"THE ULTIMATE LOW COST WIRE ROPE"

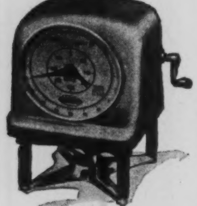


Newest Developments

in Stationary and Portable Asphalt Plant Design . . .

• Nearly 50 years ago Hetherington & Berner built the first asphalt mixing plant to be constructed in America. From that day to this we have specialized in the design and production of asphalt plants—continually working to improve their efficiency. H & B asphalt plants of today—both stationary and portable—incorporate the latest developments in design which have been proved in performance. Specifications conform to the most rigid state and city requirements, both as to engineering design and safety regulations. Write for Bulletin EN-260.

HETHERINGTON & BERNER Inc.
INDIANAPOLIS • INDIANA



THE
"Brass Brain"
(FLUIDOMETER)

This automatic metering system saves time, materials—insures uniformity. For all types of plants.

H&B
Hetherington & Berner

BRITTIN BRACKETS SAVE MONEY

In building SCAFFOLDS —HORSES

Dismantled by slipping legs out of bracket.

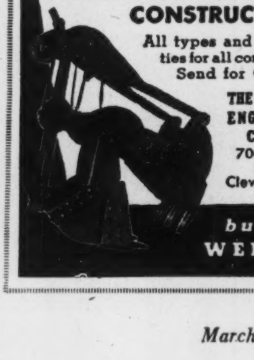
Minimum storage and drayage. Bracing unnecessary—set up quickly—strong—safe—guaranteed.

Your demands promptly fulfilled.

EDWARD B. BRITTIN
412 So. 7th St., Res., Springfield, Ill.
5420 Connecticut Ave., Washington, D. C.

WILLIAMS *Buckets*

WELDED ROLLED STEEL CONSTRUCTION



All types and capacities for all conditions. Send for Catalog.

THE WELLMAN ENGINEERING COMPANY
7000 Central Avenue
Cleveland, Ohio

built by
WELLMAN

ing the high-speed requirements of roads in recent years were designed perfected by Mr. Blunt.

William R. Jackson has been na secretary-treasurer of Pittsburgh Moines Steel Co., succeeding George Smith, who is retiring from the comp after 44 years of active service. R Jackson has been appointed assis secretary-treasurer, and A. B. Sander has been elected a director of company.

Roy A. Hunt, president of Alumin Co. of America, has announced that result of a renegotiation agreement tered into with the Government, Al made effective on March 1, a new lower schedule of prices for semi-fa cated and fabricated aluminum.

Clarence M. Steele, senior mem of James C. Steele & Sons, manufactu of heavy machinery, died Feb. 16, Statesville, N. C. He was 70 years and had been with the company appr mately 50 years.

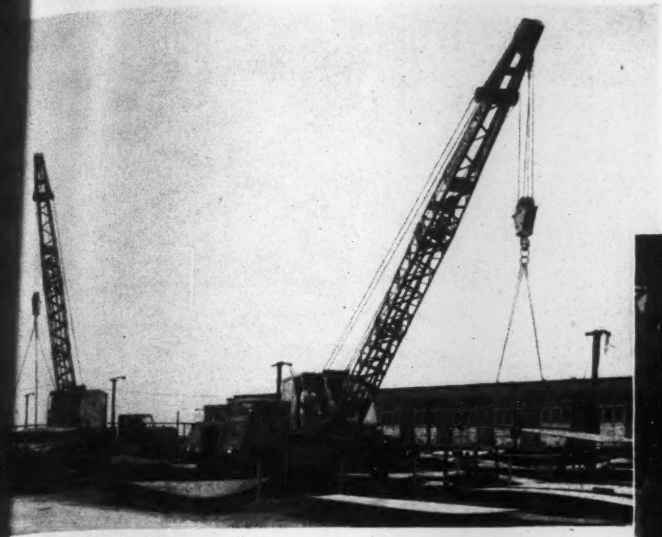
Timothy J. Lynch, for more than years New England district manager the Allis-Chalmers Mfg. Co. at Bost died there Feb. 2.

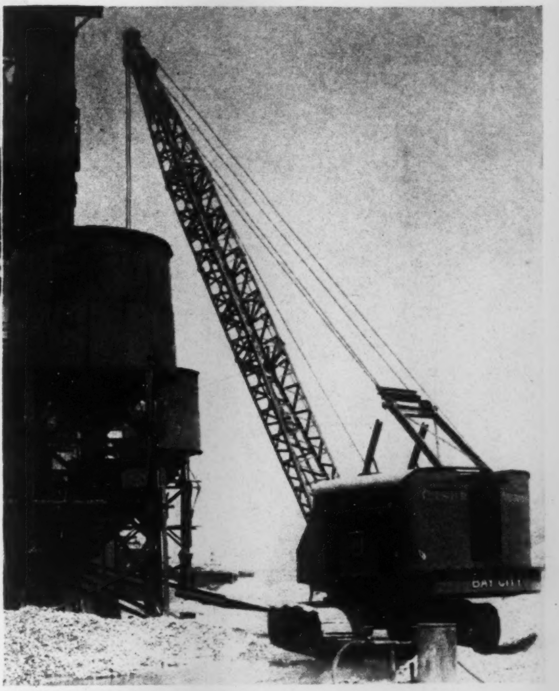
GOLDEN-ANDERSON...
...FOR ALL TYPES OF WATER CONTROL.
... CUSHIONE SWING CHEC VALVES!

Constructed to eliminate serious surge and water hammer, this balanced check valve instantly closes before reverse flow occurs, thus preventing any possibility of reversing of pump or motor. Needle valve regulation may be adjusted to any required operating speed. Valves are furnish with body and bonnet of cast-iron, semi-st and cast steel with non-corrosive trim of bron Sizes range from 3" to 36".

Write today for our catalog No. 26—describes this and all other G-A valves.

GOLDEN-ANDERSON
VALVE SPECIALTY CO.
PITTSBURGH, PA.





FOR *POST-WAR* NEEDS

While all available production is now going to the Armed Services and essential projects, we will be glad to send detailed specifications on any machine listed below. Right now, might be your best time to plan for equipment you will need on post-war construction.

AY CITY SHOVELS, Inc., Bay City, Mich.

Distributors in principal cities

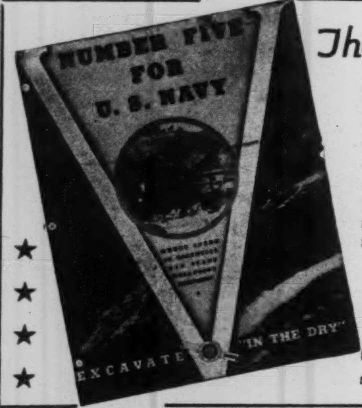
	CRAWLER-MOUNTED—Fully Convertible							TRUCK-MOUNTED–'Crane Mobile'			
Model	20	25	30	42	45	62	65	15	15A	18	18S
hovel—weight	20,000	25,400	30,000	42,000	44,400	67,400	73,700	35,100	39,400	48,800	52,300
Boom (ft.)	14	15	17	18	19	21	21	15	15	18	18
Handle (ft.)	10	11	12	13	14	16	16	11	11	13	13
Bucket (cu.yd.)	⅜	½	½	¾	¾	1	1¼	½	½	¾	¾
Crane—weight	19,100	23,800	27,800	37,800	41,600	63,000	66,700	32,400	37,700	46,300	51,800
Boom (ft.)	25	30	30	35	35	40	45	25	25	30	30
Rating (tons)	4½	5	6	8	10	17½	20	7½	10	16½	20
Min. Radius (ft.)	10	12	12	12	12	12	12	10	10	10	10
Bucket (cu.yd.)	⅜	½	½	¾	¾	1	1¼	½	½	¾	¾
Trench Hoe—weight	20,000	26,500	30,500	42,300	46,100	66,000	73,000	35,100	39,200	49,100	52,600
Boom (ft.)	14	15	17	19	19	21	21	15	15	19	19
Handle (ft.)	4′–7″	5′–1″	5′–1″	7	7	8′–2″	8′–2″	5′–1″	5′–1″	7	7
Bucket width (in.)	18–24	18–24	18–30	24–36	24–36	36–48	36–48	18–24	18–24	24–36	24–36
Power—H.P.	46	54	54	78	78	98	114	53	54	67	81
Rpm.	1,400	1,400	1,400	1,200	1,200	1,200	1,200	1,400	1,400	1,300	1,200

All boom lengths nominal. Pile Driver and Skimmer attachments available. Optional Diesel engines all models. Crane-Mobile models mounted on specially designed crane carrier of our own manufacturer.

BAY CITY SHOVELS
12 Sizes
⅜ to 1½ Yard
Also truck mounted shovels and cranes

BAY CITY

SHOVELS • CRANES • DRAGLINES • TRENCH-HOES • SKIMMERS



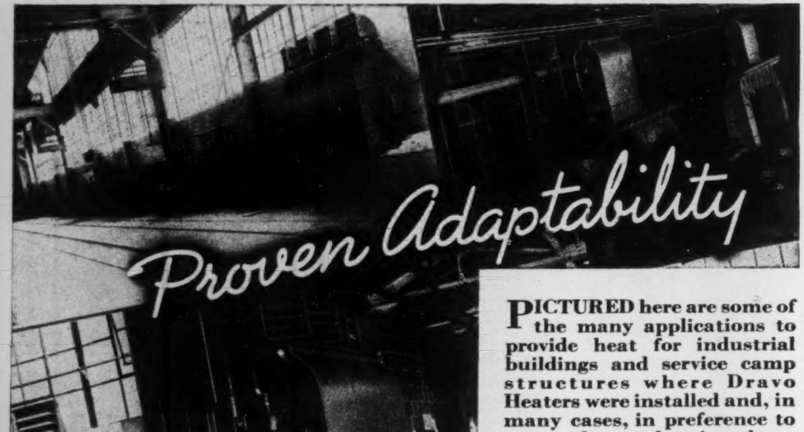
★
★
★
★

The **WELLPOINT INDUSTRY**

has made its contribution to the war effort. Read about it in this Victory Bulletin—yours for the asking. The bulletin tells by word and picture how wet excavation is converted to dry excavation, saving sheeting and cofferdams. On small or large projects, Wellpoint equipment assures speed and economy during excavating and subsequent operations.

FOR SALE OR RENT

JOHN W. STANG CORP.
NUMBER TWO BROADWAY, NEW YORK CITY
also 2322 Newton Avenue, San Diego, Calif.



PICTURED here are some of the many applications to provide heat for industrial buildings and service camp structures where Dravo Heaters were installed and, in many cases, in preference to a central steam heating plant.

Each Dravo direct fired heater is a self-contained unit with its own combustion chamber, motor and fans to circulate the warm air in the space to be heated. One or more of these heaters can be arranged to heat buildings of any shape.

Such a system is quickly installed, furnishes instant heat and represents a substantial saving in manhours and scarce metals over a central steam heating plant and necessary distributing system.

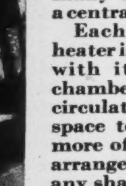
Types for any application—models for all fuels—request Bulletin 505—or consult "Sweets."

DRAVO CORPORATION
Heater Department
DRAVO BLDG., PITTSBURGH, PA.
Forty-seven Sales Offices in Principal Cities

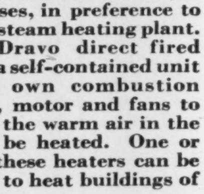
650,000
to
1,650,000
B.t.u.
per hr. Output

OIL

DRAVO
DIRECT FIRED
HEATERS



GAS



COAL

NEW TRADE PUBLICATIONS

Aerators and Supernatant Selectors—Four instructive bulletins have been published by the Pacific Flush-Tank Co., Chicago, Ill., covering its new line of atomizing type aerators and supernatant selectors for various municipal and commercial purposes. The subjects covered include pre-aeration of sewage and grease removal (Bulletin No. 140), pre-treatment of laundry and related trade wastes (No. 141), supernatant treatment (No. 142) and supernatant selectors for digestion tanks (No. 143). These bulletins will be sent separately or together, without obligation or charge, upon request to—*Pacific Flush-Tank Co.*, 4241 *Ravenswood Ave., Chicago, Ill.*

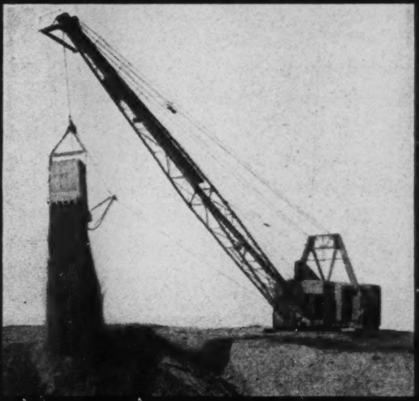
Electrical Distribution Ducts—A very complete and well organized handbook describing the Busbar method of electrical distribution for industrial plants and commercial buildings. This 76-page book should prove highly useful for its general description and illustrations of basic designs, methods of estimating and layout, symbols for layout men and estimators, suggested hanger arrangements, technical information and construction details, application data, typical specifications, etc. Divisional pages of district color design divide the book into representative sections dealing with the following: "LO-X (low reactance) feeder type bus duct," "Plug-in type bus duct for branch circuits," and "Dimensional data and useful information." Copies can be had upon request to—*Bulldog Electric Products Co.*, 7610 *Jos. Campau Ave., Detroit, Mich.*

Portable Hoist—A descriptive bulletin illustrating the use of their new portable hoist on several big government jobs has been issued by the Clipper Mfg. Co. These portable hoists can be used for handling brick, tile, mortar, flue lining, and other similar materials at a rapid rate, and according to the manufacturers, at a low initial cost. This bulletin will be sent upon request to—*Clipper Mfg. Co.*, 4030 *Manchester, St. Louis, Mo.*

Redwood Data Sheets—The California Redwood Association has compiled and are distributing a series of data sheets, which contain much valuable technical information of value to constructors and

WHERE OTHERS FEAR to TREAD

BUCYRUS-MONIGHANS walk surely . . . over rough ground or soft. They side-step obstacles, waste no time getting from one digging position to the next. They can work close to the edge of the bank, with consequent increase in effective range. They walk "softly," cushioning down with an ease that means long life. Because of the exclusive "Rolling Cam," they walk efficiently throughout millions of yards of tough digging. Performance has proved them the type of dragline that can handle the high pressure production so essential in wartime. They are available with booms up to 250 feet and buckets up to 20 yards.



A WALKING ACTION *that lasts!*

BUCYRUS MONIGHAN

SOLD BY
BUCYRUS-ERIE COMPANY
SOUTH MILWAUKEE, WISCONSIN

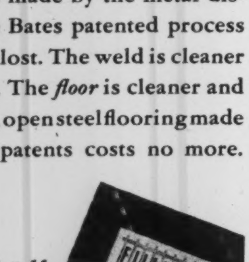
Get

BATES-GRATES

FOR YOUR OPEN STEEL FLOORING AND YOUR FLOORS, TOO, WILL BE CLEANER AND SAFER

See that scraper tread—and the crisp lines of the Hex cross bar? *That* gives a safer and cleaner tread and at the bottom of those cross bars you find clean, well-shaped fillets made by the metal displaced in the Bates patented process—no metal is lost. The weld is cleaner and stronger. The *floor* is cleaner and stronger. Yet, open steel flooring made under Bates patents costs no more.

Write for 8½ x 11 booklet that explains all details and shows many fine installations.



WALTER BATES COMPANY, INC.
1707 ROWELL AVENUE • JOLIET, ILLINOIS
OPEN STEEL FLOORING • STAIR TREADS

engineers, on various uses of its products. Illustrated with tables, drawings and pictures, the bulletins range from two to 16 pages, are of uniform size, 8½x11 in., and are punched for handy insertion in standard three-hole binders. Subjects covered in the various bulletins are as follows: Redwood tanks and vats; redwood pipe, mill roofs; built-up redwood gutters and drainpipe; industrial sash and frames; industrial fences; redwood laminated culverts; redwood expansion joints; redwood in sewage treatment plants; reservoir roofs; California redwood—its properties and uses. Any one or all of the data sheets may be obtained without obligation by writing to—*California Redwood Association,* 405 *Montgomery St., San Francisco, Cal.*

Corrosion Data Work Sheet—These corrosion data sheets have been designed to assist executives and engineers in their study of corrosion problems. The data acts as a check list to insure consideration and evaluation of all factors influencing a corrosive action. It also permits ready comparison of a problem with similar ones which may be used as a guide for selecting materials possessing a satisfactory resistance. The sheets were developed by the International Nickel Co.

THE GORMAN-RUPP DISTRIBUTOR WILL restore YOUR EQUIPMENT
GORMAN RUPP PUMPS

As more materials are diverted to essential war uses, new equipment becomes more difficult to get. Greater care must be given present equipment until after Victory. Let your Gorman-Rupp distributor restore your equipment to its original operating efficiency. They carry parts and repairs for all equipment they sell. Their charges will be reasonable.

Gorman-Rupp Self-Priming Centrifugal Pumps are available for immediate delivery through Gorman-Rupp Distributors.

THE GORMAN-RUPP CO. Mansfield, Ohio

Here are 10 basic boo
of day-in-day-out valu
in ONE low-priced volum

This book is carefully planned to give t information needed by men who actual plan, select, design, and construct ci engineering structures and projects—in o compact volume and at a reasonable pri The new 1940 edition blends theor practice and fundamentals equally; a answers your questions in *any* division civil engineering.

CIVIL ENGINEERING HANDBOOK

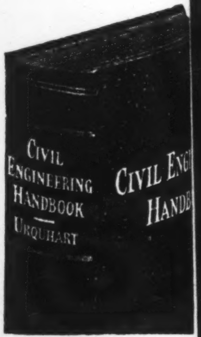
Editor-in-chief: L. C. Urquhart, Profes of Structural Engineering, Cornell Univer sity. 2nd edition. 870 pp., illus., $5.0

Here are the fundamentals of the variou subdivisions of civil engineering for th use of practicing engineers confronted wit specific problems, particularly those outside their specialized fields. The boo offers you ten complete treatises on th ten major subdivisions of civil engineering each written by a specialist of internationa reputation in his field.

10 BIG SECTIONS

Surveying
Railway and Highway Engineering
Mechanics of Materials
Hydraulics
Stresses in Framed Structures
Steel Design
Concrete
Foundations
Sewerage and Sewage Disposal
Water Supply and Purification

SEE IT 10 DAYS



SEND THIS COUPON TODAY
McGRAW-HILL BOOK CO., INC.
330 West 42nd Street, New York City

Send me Urquhart's Civil Engineering Handbook for 10 days' examination on approval. In 10 days I will send $5.00, plus few cents postage, or return book postpaid. (Postage paid on orders accompanied by remittance.)

Name ....
Address ....
City and State ....
Position ....
Company .... NR. 3-11-43

QUIZ on application of *soil-cement* for light traffic war pavements

hen should soil-cement be considered?

swer: The field of use of soil-cement includes low first-cost auxiliary and secondary airport surfaces, plane parking areas and taxiways, light-traffic military roads and streets, parking areas for army trucks and war workers' cars, road shoulders and widening.

at types of soil can be processed?

swer: Soils on the site are usually satisfactory. Old gravel or stone roads also can be successfully treated. 50% minus No. 4 sieve material is needed.

hat engineering supervision is required?

swer: Job control by a full engineering field force giving careful attention to details is essential. Simple, scientific procedures in *both* laboratory and field assure uniform results at any job speed.

What rate of construction can be planned?

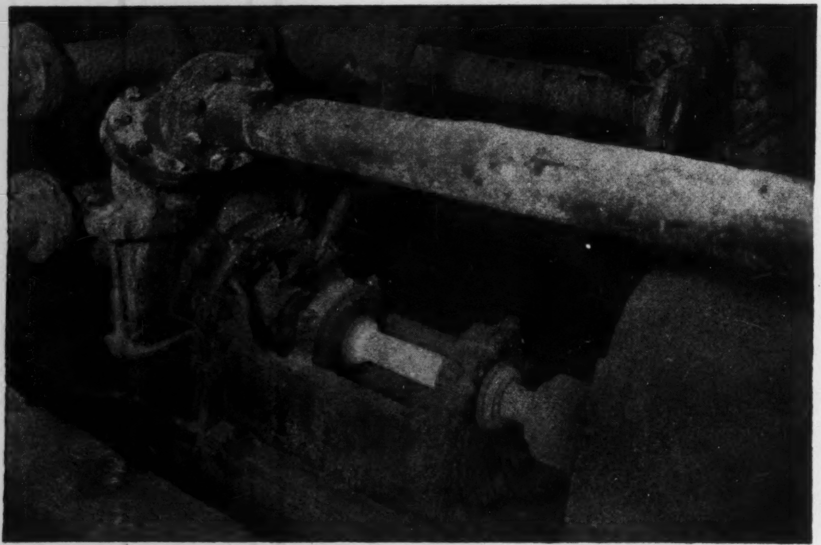
Answer: Usually 5,000 to 10,000 sq.yd. daily; 10,000 to 20,000 frequently obtained; 350,000 sq.yd. in 19 working days reported for one job; 26,000 sq.yd. in peak day of 16 hours on another. Rate of production may depend on ability to put competent engineers on the job, rather than on work crews and equipment. Speed is result of efficient organization of simple equipment and small crews of ordinary labor.

What material must be transported?

Answer: Generally just the cement and water. Soil-cement, being approximately 85 to 90% soil, requires little trucking or rail haul of materials. When borrow soils are occasionally used, short truck haul is common.

Call on our engineers for design and construction assistance on your soil-cement war projects. Write for new laboratory handbook, *"Soil-Cement Mixtures,"* mailed free in the U. S. or Canada.

PORTLAND CEMENT ASSOCIATION
Dept. A3b-170,33 W. Grand Avenue, Chicago, Illinois
BUY WAR SAVINGS BONDS AND STAMPS

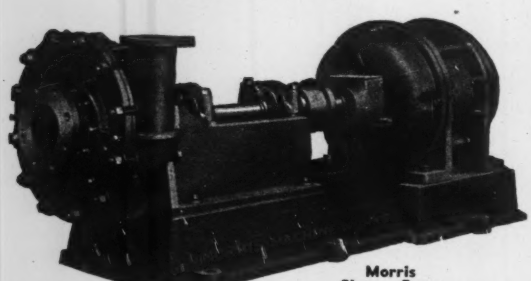


“FULL OF GRIT”

This Morris Slurry Pump is centainly "full of grit" . . . both literally and figuratively. The illustration plainly shows the severely abrasive material it must handle . . . but it has done so year after year, effectively, economically, and without complaint.

That's the kind of service you can expect from *every* Morris Pump . . . whether designed for pulpy materials, abrasive mixtures, chemicals, or clear water. Here's the reason . . . Morris has specialized on "hard-to-handle" pumping services for 78 years and *knows how.*

Send for Bulletin



Morris
Slurry Pump

MORRIS MACHINE WORKS
MORRIS
ESTABLISHED 1864
BALDWINSVILLE NEW YORK

CENTRIFUGAL PUMPS

through its technical service as a r of extensive experience with corro data inquiries that inadequately descr conditions for which recommendat were sought. These data are not lim to monel, nickel and Inconel, but als clude those for a wide range of const tion materials and their relative perfo ances against a host of corrosives service conditions. Copies of the rosion Data Work Sheet may be obtai without charge from—*Technical Serv The International Nickel Co., 67 Wall New York, N. Y.*

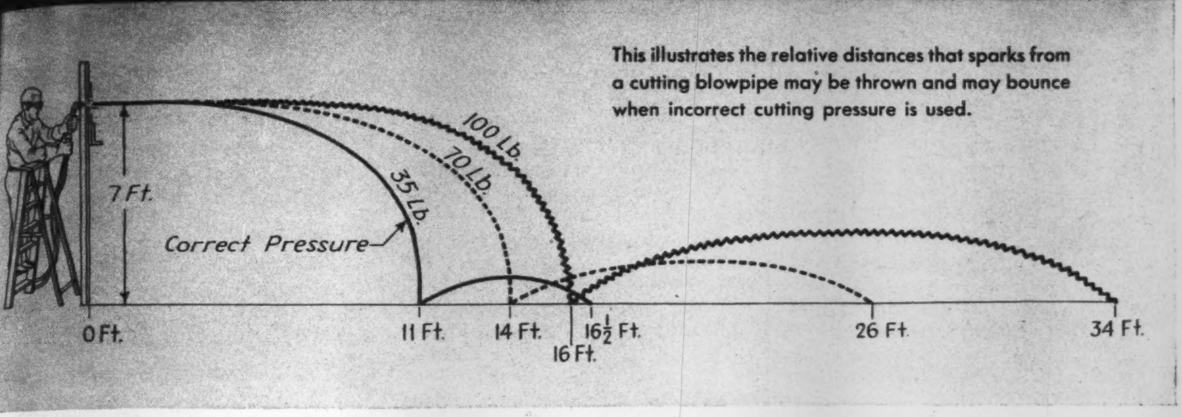
Portable Batching Plant—A 4-p bulletin describing a new porta batcher plant designed to proportion c crete materials for mixing equipment a minimum handling cost. A detail dr ing showing complete design featu together with photographs and desc tive data, and specifications covering capacity, skip capacity, power, aggreg elevator, distributor, cement screw, scal hydraulic system, chassis, etc., gives very complete picture of the equipme These data may be had by addressi the—*C. S. Johnson Co., Champaign,*

Return Units—Two 4-page bulleti one describing their vacuum return un and the other their condensate retu unit, have been issued by the Am Hydrovac Corp. The two machines d scribed are the latest designs in th form of equipment, according to t manufacturer, and the information co tained in these bulletins, including d tail drawings, charts, etc., is well pr sented and informative. Engineers i terested in this type of equipment wi find this literature of value for their da files—*Address, Ames Hydrovac Corp 20 Scholes St., Brooklyn, N. Y.*

Metal Cutting Tools—This new to manual for operators on metal cuttin machines is a vest-pocket edition ru gedly bound to withstand continuous us in the shops. Its 52 pages contain com plete information on the care, handlin and most efficient methods of using Ke nametal tools. More than 100 drawing illustrate tool applications, operation tool styles, and instruction for grindin tool design, and brazing blanks to use shanks to make tools in the operator own shop. The manual presents table on grinding wheel recommendations, su gested speeds of operation in relation t the hardness of the work-piece, prope chip breaker dimensions, and corre grade selection. Copies of the manua may be had by addressing—*McKenn Metals Co., Latrobe, Pa.*

Air Brush—An interesting 32-pag booklet, featuring spray equipment o the job, has been issued by the Eclips

WATCH THOSE *Sparks*..
TO MINIMIZE FIRE HAZARD


This illustrates the relative distances that sparks from a cutting blowpipe may be thrown and may bounce when incorrect cutting pressure is used.

During oxy-acetylene cutting operations, the larger the area into which sparks are thrown, the greater will be the danger of fire. Sparks scattered several feet from the scene of cutting may lodge in cracks or crevices of combustible material and smoulder there unnoticed until flames burst forth. Sparks should, therefore, be confined to as small an area as possible.

Avoid Excessive Pressures

A most important factor in controlling sparks is the use of no more than the correct oxygen pressure as specified in the instructions supplied with each blowpipe. Excessive oxygen pressure not only wastes oxygen, produces an inferior quality of cut, and slows cutting by the cooling effect of the excess oxygen, but also increases the distance that hot slag or sparks are thrown—particularly when the cutting is done in a horizontal position.

Use a Spark Shield!

An effective shield, which will reduce the distance that sparks are thrown, can be improvised by suspending sheet metal or asbestos paper 2 or 3 feet square, in the path of the sparks about 18 inches from the blowpipe. Such a shield will prevent sparks from flying or rolling great distances and will thereby lessen the danger of fire.

Instruction Books Available

The instruction books packed with all oxy-acetylene blowpipes supplied by Linde include charts showing correct gas pressures to be used. Duplicate copies will be sent, without charge, upon request. Be sure to specify the blowpipes you have.

Also available from any Linde office is the booklet "Preventing Welding and Cutting Fires."

MARITIME "M" AWARD
FOR OUTSTANDING
PRODUCTION ACHIEVEMENT

THE LINDE AIR PRODUCTS COMPANY
Unit of Union Carbide and Carbon Corporation
UCC
General Office: New York, N.Y. **Offices in Principal Cities**
In Canada: Dominion Oxygen Company, Limited, Toronto

LINDE OXYGEN . . . PREST-O-LITE ACETYLENE . . . UNION CARBIDE
OXWELD, PUROX, PREST-O-WELD APPARATUS . . . OXWELD SUPPLIES

THE LINDE AIR PRODUCTS COMPANY
30 East 42nd Street, New York, N. Y.

FOR VICTORY
BUY
UNITED STATES
WAR
BONDS
AND
STAMPS

Please send me without cost —
1. Duplicate copy of the instruction booklet for each of the blowpipes specified below.
☐ Oxweld Type........ ☐ Purox Type........
☐ Prest-O-Weld Type..........
2. The booklet "Preventing Welding and Cutting Fires."

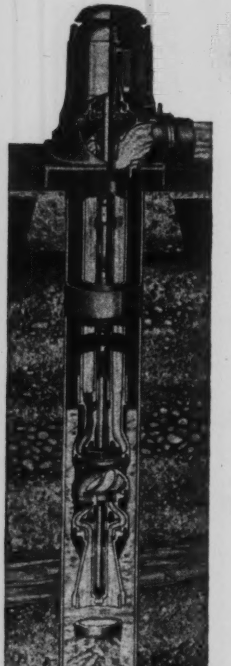
Name ....
Street and Number..
City and State..

The words "Linde," "Prest-O-Lite," "Union," "Oxweld," "Purox," and "Prest-O-Weld" are trade-marks.

More Care Means Longer Wear

REPAIR PARTS, MAINTENANCE HINTS AND ENGINEERING ASSISTANCE ARE AVAILABLE FROM PEERLESS DEALERS AND FACTORIES

The whole Peerless organization is back of a program of cooperating with you to insure a never-failing water supply from your Peerless Pump. Today, heavy production schedules may have imposed extraordinary demands on your pump. Your Peerless Pump is built for this kind of service but extra pump care will provide longest pump wear. If you can anticipate your needs for pump parts, or can take advantage of helpful maintenance hints, or need engineering assistance for your pump, call on your Peerless dealer or Peerless factory. Your cooperation, plus proper maintenance, plus Peerless service will protect the performance of your pump.



PEERLESS PUMPS

PATENTED DOUBLE SEAL

DOUBLE BOWL BEARINGS

WIDEST RANGE OF CAPACITIES

UP TO 15,000 G.P.M. IN TURBINE TYPES

UP TO 200,000 G.P.M. IN HYDRO-FOIL PROPELLER TYPES

ALL FORMS OF DRIVE

NATIONWIDE SUPER SERVICE

●

Ask for Literature.

Also inquire about Peerless Gasoline and Fuel Oil Pumps for direct refueling and transfer.

PEERLESS PUMP DIV.—Food Mach'y. Corp.

Factories: Los Angeles, San Jose, Fresno, Calif. and Canton, Ohio

★ WATER OR OIL LUBRICATION

Peerless

TURBINE PUMPS

Air Brush Co., Inc. This profusely illustrated catalog shows many examples of how others are handling their spray problems. Actual spray operations in various industries such as shipbuilding, machinery, structural steel, and other fields, give the reader a clearcut idea of the scope of the equipment's application. The booklet may be obtained without cost by addressing the manufacturer on your company letterhead—*The Eclipse Air Brush Co., Inc.,* 400 *Park Ave., Newark, N. J.*

Electric Motors—A 10-page booklet giving specification data on a variety of motors, covering voltage, speed and horsepower available, and other technical information which will be of value to anyone in choosing a motor for a specific job. This literature, which is Bulletin No. 210, may be had without cost by addressing—*Ohio Electric Mfg. Co., Cleveland, Ohio.*

Welding and Brazing—A highly instructive booklet of 100 pages covering the whole field of welding and brazing is now obtainable. This booklet is a completely rewritten edition of Aluminum Co. of America's welding booklet, which incorporates much valuable data on the art of brazing. At this time when welding is playing such a vital part in speeding construction in many fields vital to the war effort, the data in this booklet should prove extremely valuable to anyone interested in the subject. The booklet will be sent without cost to anyone who may request it by addressing—*Aluminum Company of America, Pittsburgh, Pa.*

Roof Ventilators—The Swartwout Co. have added a new line of roof ventilators "NCM" made of non-critical materials, and have issued an 8-page bulletin showing design and construction, together with pertinent information on these new ventilators. In many cases they are patterned after the original metal Swartwout ventilators. They are intended for use in essential applications where metal is not vitally necessary. Literature describing the ventilators will be sent upon request to — *Swartwout Co.,* 18511 *Euclid Ave., Cleveland, Ohio.*

Zinc—The American Zinc Institute has issued a booklet, "Zinc in Wartime," which contains few statistics but hundreds of photographs, most of them official army and navy pictures. These photographs, together with the accompanying text, describe the many military and essential civilian uses to which zinc is put today. Copies of this pamphlet may be obtained free of charge upon receipt of a written request by—*American Zinc Institute, Inc., 60 E. 42nd St., New York, N. Y.*

KEEP YOUR CONVEYOR BELTS GOING

FLEXCO H D RIP PLATES are used in repairing rips and patching conveyor belts. Their use saves expensive replacements and extended shutdowns.

FLEXCO H D BELT FASTENERS make a strong, tight butt joint with long life. Recessed plates embed in belt, compress belt ends and prevent ply separation. Six sizes in steel and alloys.

● **Avoid** shutdowns an **lengthen** the life of yo **conveyor** belts and **bucke** **elevator** belts by usin **Flexco belt** fasteners. Thou **sands of** companies hav **stepped up** the perform **ance of conveyor** lines and **cut costs by** using Flexco **methods.**

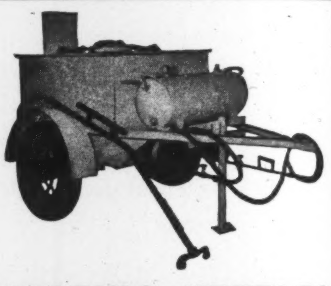
Bulletin F-100 shows exactly how to make tight butt joints in conveyor belts with Flexco. Also illustrates step by step the latest practice in repairing rips and putting in patches.

Write for your copy.

FLEXIBLE STEEL LACING CO.
4656 Lexington St., Chicago

FLEXCO HD BELT FASTENERS

Sold by supply houses everywhere



HEATING KETTLES

FOR ASPHALT AND TAR

Fire Proof — Oil Burning
Hand and Motor Driven Spray

◆

Other Products

CONCRETE VIBRATORS
Gasoline Engine and Electric Motor Driven Models

FRONT END SHOVELS
for Case DI Tractors

AGGREGATE DRYERS
for Stone and Sand

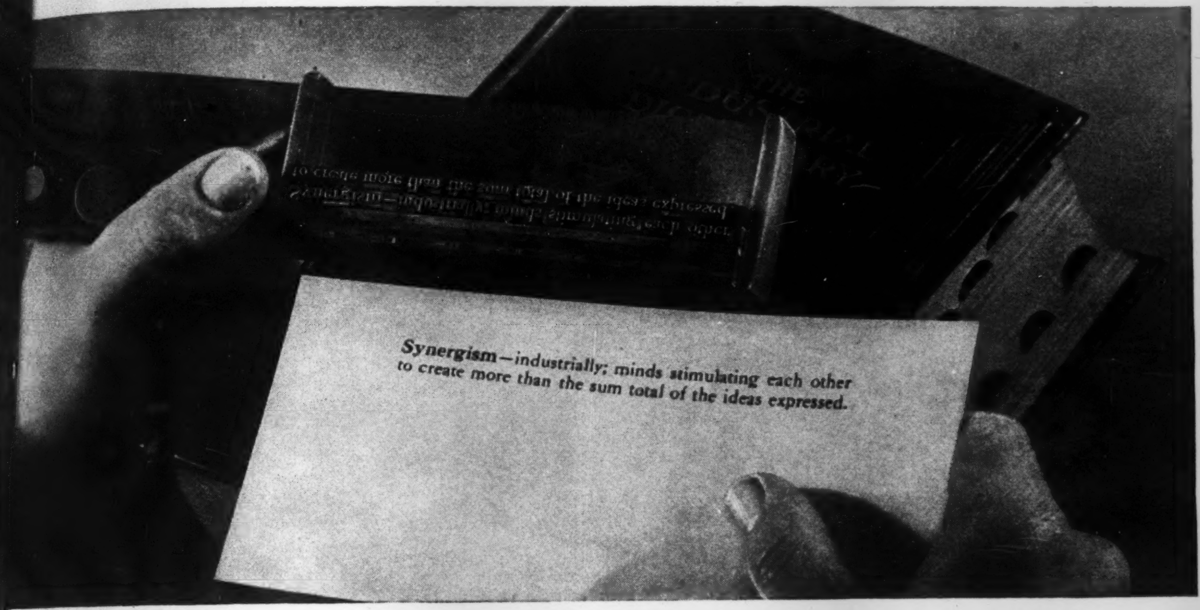
ASPHALT PLANTS
Portable — Stationary

Write for Circulars

White Mfg. Co.

ELKHART **INDIANA**

A New Definition



Synergism—industrially; minds stimulating each other to create more than the sum total of the ideas expressed.

for the Industrial Dictionary

New ideas create new products, new methods, new words to describe them. And out of this war a word is emerging with a new meaning for future industrial progress—"Synergism."

War production has brought gigantic strides in industrial cooperation. Men have banded together to cooperate with a will-to-accomplish in a degree far greater than ever the world has known.

As minds meet to cooperate with the single purpose of accomplishment, they stimulate each other to create more than the sum total of the ideas expressed—"click to give a plus value" might be the slang for it. This is "Synergism."

Synergism is not a new word. It's an old word, with classic Greek roots meaning "working together." It long has had its meaning in chemistry, in medicine, in theology. Basically, it has always meant forces working together to develop a whole greater than the sum of the parts.

And war accomplishment has re-introduced "Synergism" with a significant meaning for Industry. It provides a name for the factor that keeps working miracles in industrial progress.

We at Atlas have been practicing synergism in our spheres of chemical production to accomplish some outstanding results in collaboration with other companies. We think our minds will "click" with yours. Let us try the experiment.

ATLAS POWDER COMPANY
WILMINGTON, DELAWARE
Offices in Principal Cities

Industrial Explosives • Industrial Finishes • Coated Fabrics • Acids
Activated Carbons • Industrial Chemicals • Ordnance Materiel

Copyright 1943, Atlas Powder Company

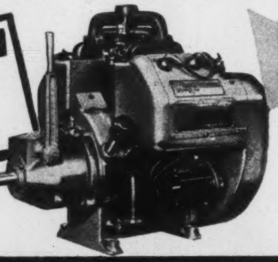
IF ENGINE POWER IS NEEDED . . .

Here's Your Engine!

Machine designing engineers, contractors, farmers, oil operators and industrial users are more and more rcognizing the amazing versatility, heavy-duty dependability, fit-the-machine compactness, light weight and economy of WISCONSIN AIR-COOLED ENGINES. Specify these engines for *today's* work as well as for *tomorrow's* applications.

Power range: 1 to 35 hp., 1 and 4-cylinder types.
Model VE-4, 22 hp., 4-cylinder V-type illustrated.

BUY BONDS FOR
VICTORY



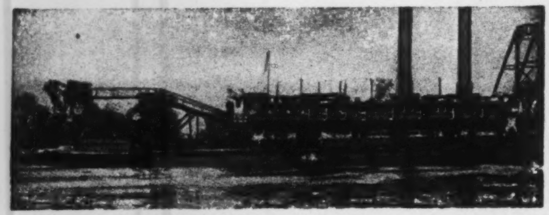
WISCONSIN
Air-Cooled
ENGINES

MOST
POWER
Per
POUND

WISCONSIN MOTOR
Corporation
MILWAUKEE, WISCONSIN, U. S. A.

World's Largest Builders of Heavy-Duty Air-Cooled Engines

DREDGING



Filling, Land Reclamation, Canals and Port Works

River and Harbor Improvements
Deep Waterways and Ship Channels

We are equipped to execute all kinds of dredging, reclamation and port work anywhere in the United States

Contractors to the Federal Government

Correspondence invited from Corporate and Private Interests Everywhere

Largest Plant **Longest Experience**

Atlantic, Gulf and Pacific Co.

21 Park Row
New York

Citizens State Bank Bldg.
Houston, Texas

MEN AND JOBS

Capt. Rudolph G. Borz, civil engi
ing graduate of the University of
consin, has been promoted to the
of major. He is now serving as
ordinator of requisitions for engi
spare parts equipment at Colum
Ohio. Major Borz was formerly
WPB in Washington.

Charles Pfeiffer, city engineer
Oswego, N. Y., has resigned to ac
a position with the city of East Au
N. Y.

Lewis H. McDannold has been m
head of the municipally owned w
plant at Versailes, Ky.

Lieut. Col. Stewart A. Marshall,
formerly area engineer of the Colum
S. C. area, has been elevated to
position of regional director of rep
and utilities in the South Atlantic
vision. Colonel Marshall will have
office at **Memphis, Tenn.,** and will sup
vise the activities of post engineers
all stations in western Tennessee, nor
ern Alabama and northern Mississip
He is succeeded by **Maj. George**
Svoboda, formerly area engineer at Sh
Field and also at the Congaree
base. The offices at Congaree, Nor
and Columbia Army Air Base will
consolidated with the Fort Jackson off
under the supervision of Maj. Svobod
whose headquarters will be located
Fort Jackson, S. C.

Norman Hebden, executive director
the American Public Works Associatio
has been granted leave of absence
accept an appointment as a major
the army. On Feb. 16 he reported f
duty with the protection branch, Six
Civilian Defense Region, Chicago.

Lieut. Col. John H. Peil is now distri
engineer at Rock Island, Ill., for th
Corps of Engineers. Colonel Peil ha
been employed in the Rock Island Dis
trict for several years, including a num
ber years in a civilian capacity. Col
Wm. J. Matteson, until recently distric
engineer, has been re-assigned in th
Corps of Engineers.

Lee T. Grider, of Los Angeles, Cal., for
many years general superintendent for
Bent Brothers, Inc., has been made
project manager for the West Construction Co. (reported in *ENR*, Feb. 4, a
the Western Construction Co.) on the
second Nisqually power development for
the city of Tacoma, Wash.

Lieut. Col. John H. Thompson, formerly a contractor and county engineer

We have two reasons to be proud of this Flag

rst, of course, we are proud of the Army-Navy "E" g because it is an award to the 3,000 employees of our chmond refinery. We have long known that their energy, votion and skill merit the highest praise.

The other reason is that this flag is a harbinger of better ys to come, when we will take pride in offering to industry e fruits of Richmond's tremendous war effort.

Today we can only hint at the giant strides our petroleum search and production have made. We cannot publish the ecifications of a host of new products, nor the story of how d products have been sensationally improved. We cannot escribe the system by which these products are distributed a world-wide scale.

But we can promise you that, when these facts become nown, they will open new horizons for American business-en and technicians in many fields. They will prove once gain that "know-how" can turn yesterday's impossibilities to tomorrow's accomplishments.

In the meantime, the Richmond refinery and all of tandard of California are living up to the "E" flag, help-ng bring the inevitable victory nearer.

TANDARD OIL COMPANY OF CALIFORNIA

RPM DELO IS USED IN U. S. NAVY DIESELS First used in submarines, RPM DELO performed so well that it is now also used to lubricate high-speed Diesels in the Navy's mine sweepers, sub chasers, landing barges, patrol boats and ocean-going tugs. In all these vessels it is licking some of the toughest lubricating problems in the world. RPM DELO is typical of Standard's development of petroleum products for war.

Quality-Service
STANDARD
RPM
DELO

RPM DELO is marketed under the following names:

RPM DELO • Caltex RPM DELO • Kyso RPM DELO
Signal RPM DELO • Imperial-RPM DELO CONCENTRATE • Sohio RPM DELO

Ask your Diesel engine manufacturer or distributor for the RPM DELO supplier in your vicinity

Why they all prefer the SAFETOP

The WATER DEPARTMENT SUPT. likes Safetop *Economy* - -

Negligible maintenance expense, ample strength to resist breakage from ordinary impacts, and repair costs that are less than 1/5 those of other hydrant designs in case of breakage due to smashing collisions.

The FIRE CHIEF likes Safetop *Convenience* - -

Convenient nozzle height, nozzle caps that unscrew quickly and drop out of the way, simple straightline operating mechanism, and full main pressure at the nozzles.

The HYDRANT MAINTENANCE MAN likes Safetop *Reliability* - -

Freedom from trouble calls, because Safetops are floodproof, frost-proof, corrosion-proof and tamper-proof. In addition, they are readily lubricated, and their tough, grit-resisting valve facings last indefinitely.

The NEIGHBORHOOD HOUSEHOLDER likes Safetop *Protection* - -

No danger of flooding if accidentally broken, no interruption of water service or street excavation, and speedy return to service if breakage repairs or extension for change of street grade are necessary.

The TRUCK CHAUFFEUR likes Safetop *Safety* - -

No likelihood of serious personal injuries in case of unavoidable collision against the hydrant due to slippery streets or traffic accidents. No fire hydrant is worth a human life.

The Kennedy Valve Mfg. Co., Elmira, N. Y.

Write for full information

KENNEDY
SAFETOP
REG. U.S. PAT. OFF.
FIRE HYDRANT

EPPINGER AND RUSSELL CO.
Wood Preservers Since 1878
All kinds of Structural Timbers and Lumber Pressure Treated with Creosote Oil or
DU PONT CZC Chromated Zinc Chloride
80 EIGHTH AVE., NEW YORK, N. Y.
POLES, CROSS ARMS, PILING, TIES POSTS, BRIDGE AND DOCK TIMBERS
TREATING PLANTS
Jacksonville, Fla. Long Island City, N. Y.

NEED A BIG Trailer?
La Crosse Makes Them Up To 200 Ton Capacity-
★★ WRITE OR WIRE ★★
LA CROSSE TRAILER & EQUIPT. CO.
LA CROSSE, WISCONSIN U. S. A.

for Jackson County, Mo., is now servi in England with the U. S. Army.

Ralph Burch, Cedar Rapids, Iowa, h accepted a position as a constructi engineer on an airport job in Kentuck

Roy L. Clark, Des Moines, Iowa, of t consulting engineering firm of Nemme & Clark, has joined the War Producti Board's Iowa staff.

Carlton R. Mueller is now employed the office of the U. S. Engineer Davenport, Iowa.

Charles T. Turner, Little Rock, Ark has entered the navy as Lieut., (j.g. Civil Engineering Corps. He was formerly with the Materials and Tests Department of the Arkansas State Highway Department for several years, late accepting a position with the Gregor Hogan Contracting Co., of Little Rock

Manuel Santos, C. E. and P. E., assistan chief engineer for the building constru tion firm of Iglehart, Caldwell & Scott Inc., on their Stewart Field contract a West Point, N. Y., has become assistan engineer in the Corps of Engineers, located at Stewart Field, West Point, N. Y

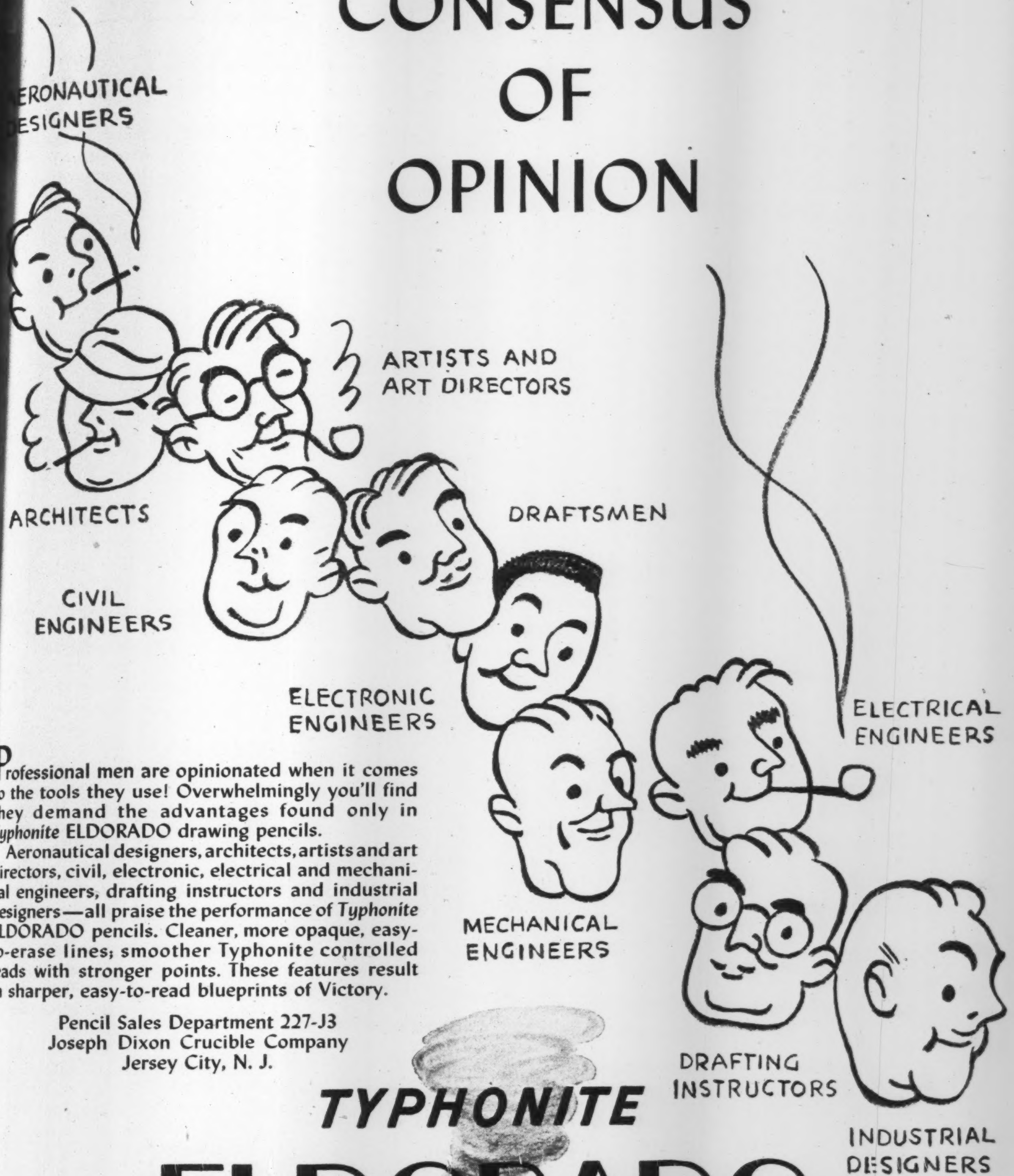
Harold J. A. Chambers, for the pas three years chief engineer of the Hamilton Bridge Co. Limited, structural stee firm of Hamilton, Ont., has been appointed general manager of the firm. Mr. Chambers is a graduate in civil engineering of the University of Toronto, and took his master's degree in engineering at the same university.

Richard N. Hunter, formerly of Charlotte, N. C., who for the past 22 months has been serving as purchasing agent for contractors working on the Marine base at New River, N. C., has just been commissioned a lieutenant, (j.g.), in the U. S. Naval Reserve (CEC), and is now stationed at Norfolk, Va.

John Anthony Volpe, Malden, Mass., owner of Volpe Construction Co., entered the armed services Feb. 15, as a lieutenant, (j.g.), U. S. Naval Reserves (CEC), and is now stationed at the naval construction training center, Naval Operating Base, Norfolk, Va.

H. G. Baity arrived in Rio de Janeiro at the end of February to begin his duties as chief engineer of the Brazilian field unit of the Public Health and Sanitation Division of the Office of Inter-American Affairs. Dr. Baity is on leave of absence from the School of Public Health, University of North Carolina.

CONSENSUS OF OPINION


AERONAUTICAL DESIGNERS
ARTISTS AND ART DIRECTORS
ARCHITECTS
DRAFTSMEN
CIVIL ENGINEERS
ELECTRONIC ENGINEERS
ELECTRICAL ENGINEERS
MECHANICAL ENGINEERS
DRAFTING INSTRUCTORS
INDUSTRIAL DESIGNERS

Professional men are opinionated when it comes to the tools they use! Overwhelmingly you'll find they demand the advantages found only in *Typhonite* ELDORADO drawing pencils.

Aeronautical designers, architects, artists and art directors, civil, electronic, electrical and mechanical engineers, drafting instructors and industrial designers—all praise the performance of *Typhonite* ELDORADO pencils. Cleaner, more opaque, easy-to-erase lines; smoother Typhonite controlled leads with stronger points. These features result in sharper, easy-to-read blueprints of Victory.

Pencil Sales Department 227-J3
Joseph Dixon Crucible Company
Jersey City, N. J.

TYPHONITE

ELDORADO

DIXON'S TYPHONITE ELDORADO — HB

Costs Reduced
. . . ON TOUGH EXCAVATING JOBS

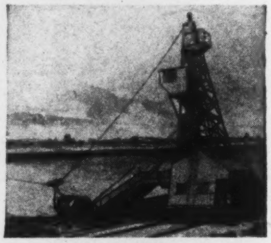
THOUSANDS of contractors have proved that SAUERMAN machines make easy work of many excavating problems that would be complicated and costly by any other method.

A SAUERMAN machine can operate on a lake shore or in a river, on mushy ground, on a hillside, or in a rough pit. The bucket will penetrate the hardest packed material, gather a heaping load quickly, then haul its load at high speed to a bin, hopper or storage pile.

Digging, hauling and automatic dumping are merged into a continuous operation controlled by one operator. Power requirement is moderate. Maintenance is simple because the wearing parts are few and easily accessible.

The sizes of SAUERMAN machines range from a light, portable unit with a 1/3 cu. yd. bucket operating on a 200-ft. span, rated to handle 20 cu. yd. per hour, up to a big, powerful machine which has an operating span of 1500 ft. and is equipped with a 15 cu. yd. scraper bucket.

Sauerman Slackline Cableway dumping spoil onto pile.



Sauerman Tower Excavator shown above offers large capacity in loading materials from pit or storage pile into cars or other conveyance.

Write for our catalog and see for yourself how others have cut costs on tough jobs with Sauerman Machines.

SAUERMAN BROS., Inc.
532 S. Clinton St. Chicago, Illinois

THIS IS THE TOUGHEST TEST

YOUR exacting circular reinforcement jobs go easier and faster, because Clinton Fabric is made UNIFORM in tensile strength of wire and in welding. You are assured of maximum strength and higher performance standards. To get this uniformity every step is supervised by experts in our own plant, from open hearth to wire drawing to welding. The fabric comes in sheets or rolls cut to your *exact* job specifications, saving your time and expense.

CLINTON
Electrically Welded
REINFORCING FABRIC

WICKWIRE SPENCER STEEL COMPANY
500 Fifth Avenue New York, N. Y.

MEETINGS

MINNESOTA SECTION, AMERICAN Wa WORKS ASSOCIATION, Minneapolis, Mi March 12–13.

NEW JERSEY SEWAGE WORKS Asso **TION,** war conference, Stacy-Trent Ho Trenton, N. J., March 25–26.

NEW YORK SECTION, AMERICAN Wa **WORKS ASSOCIATION,** Spring War-C ference Meeting, Hotel Syracuse, Sy cuse, N. Y., March 25–26.

ARKANSAS ENGINEERS CLUB, in joint s sion with Little Rock Engineers Cl Mid-South Section, American Society Civil Engineers, and Arkansas Society Registered Professional Engineers, Li Rock, Ark., March 26–27.

PACIFIC-NORTHWEST SECTION, AMERIC WATER WORKS ASSOCIATION, Bellingha Wash., May 7–8.

Elections and Activities

C. W. PHILLIPS, highway commission of Tennessee, has been elected preside of the Southeastern Association of Sta Highway Officials, succeeding W. Van Baise, Raleigh, N. C., state highway e gineer.

THE ILLINOIS SOCIETY OF ENGINEER at its annual meeting in January, hel at Decatur, Ill., elected as president W. Wallace, Chicago; vice-president, H. Morgan, Urbana, Ill.; secretary, H. Babbitt, Urbana, Ill. Some 108 membe of the organization attended the meetin

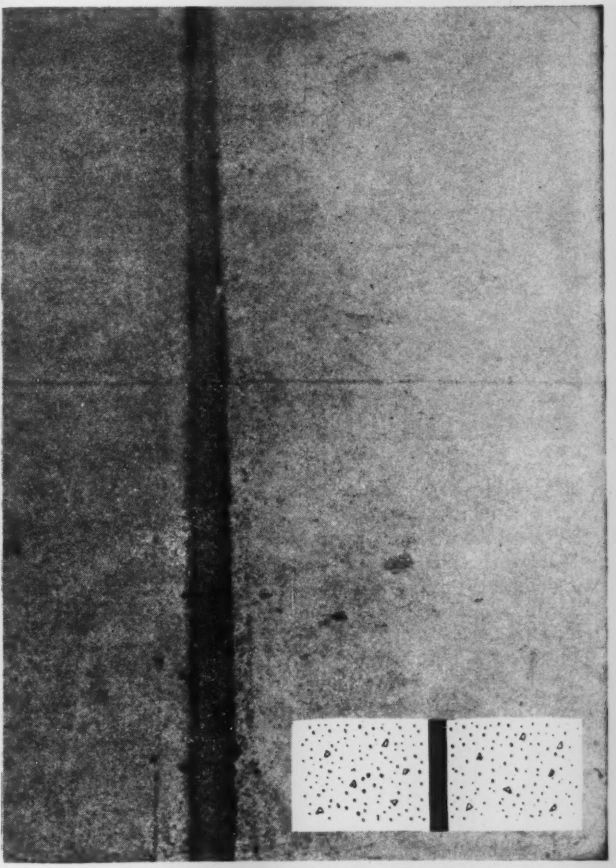
FRANK F. FOWLE, consulting enginee Chicago, has been elected president the Illinois Engineering Council, whic is composed of representatives of sever technical state organizations.

WALTER W. GRAF was elected presi dent of the Ohio Society of Professiona Engineers at their recent annual meet ing. Other officers for the ensuing yea are: vice-presidents, Thomas W. Rolph of Newark, and Eddie Fox of Cincinnati treasurer, J. R. Shank of Columbus, an secretary, Herb Morris of Sandusky Watches were presented to retiring president Prexy Kennedy and past presiden Kammerer. The meeting was attende by 302 of the Society's membership. On of the interesting features was a tal by E. J. Bisiker, British Vice Counsu of Cleveland, who described the devastation he saw in London after the Blitz S. S. Wyer gave a stimulating set o

Write for prices on FLEXCELL Bituminous Fibre Expansion Joint

AVAILABLE NOW FOR PROMPT SERVICE

NEVER LIKE THIS



ALWAYS LIKE THIS

FLEXCELL Bituminous Fibre Expansion Joint is not on the "critical" list . . . It is a resilient, non-extruding type which meets specifications of Army and Navy Departments and A. A. S. H. O. Write for complete specification data and prices!

FLEXCELL
REG. U.S. PAT. OFF.
BITUMINOUS FIBRE EXPANSION JOINT

THE CELOTEX CORPORATION • CHICAGO
World's Largest Manufacturers of Bituminous Fibre Expansion Joint

THE CELOTEX CORPORATION, CHICAGO ENR 3-11-43
Please send ☐ Complete specification data ☐ Prices on Flexcell Bituminous Fibre Expansion Joint. You may quote on
....
Name....................
Address....................
City....................
County.................... *State*....................

INDIAN
FIRE PUMPS
STOP FIRES BEFORE
THEY GET OUT
OF CONTROL . .

SMALL fires sabotage big construction projects. Squelch them at the start with **INDIAN FIRE PUMPS** — the portable, clear water extinguishers used by the Army, Navy, Fire Depts., Forest Service, etc. Big, rust-proof tank holds 5 gals. of clear water. Adjustable nozzle throws pressure stream or spray. Carried on back like pack basket, leaving arms free. Guard your properties and works with these famous fire fighters. *Send for catalog giving full details, prices.*

D. B. SMITH & CO., 426 MAIN ST., UTICA, N. Y.
Pacific Coast Branch
Hercules Equipment & Rubber Co. 435 Brannan St., San Francisco, Cal.

"GUNITE"

can reduce your construction costs. It is efficient and dependable, an established product.
WE RECOMMEND "GUNITE" for structural steel protection, floor and roof slabs, thin exterior walls, partitions, tanks, reservoirs, restoring disintegrated concrete surfaces, repairing reinforced concrete, etc. Let us suggest how "Gunite" can best solve your problems.

PRESSURE CONCRETE CO.
"GUNITE" CONTRACTORS
6 Avenue B Newark, N. J.

Hayward Buckets

Use this Class "E" Clam Shell Bucket for handling crushed stone, gravel, sand and other bulk materials.
THE HAYWARD CO., 48-50 Church St., N. Y.

specifications for the postwar w based on a recognition of the indivi The high point was the banquet add with pictures, on the building of 1,800-mile Alcan Highway, which given by H. W. Richardson, Wes editor of *Engineering News-Record*.

At a Recent Meeting of the Virg section, American Society of Civil E neers, the following officers were elec William R. Glidden, Richmond, bri engineer for the Virginia State High Department, was elected president succeed E. S. Thomas of Roanoke; T. Robey, Norfolk, first vice-preside Richard Messer, Richmond, second v president, R. A. Marr, Jr., Virginia M tary Institute, third vice-president, R. A. Rice, Richmond, secretary-tr urer. Life memberships in the natio society were presented to George Jones, assistant engineer of the Virg Bridge Co., Roanoke; Joseph E. Cr ford, retired vice-president of the N folk & Western Railway; Franklin Turner, principal assistant engineer the Norfolk & Western Railway, and R well D. Trimble, Richmond, consult engineer.

Speaking Before a recent meeting the Engineers Society of Western Pe sylvania, meeting jointly with the Pi burgh section of the American Society Civil Engineers, and the Society American Military Engineers, Maj. G Eugene Reybold, Chief of Engineers, S. Army, told members of the Soci that the system of flood control dams operation in this area paid $15,000,0 to Pittsburgh and $14,000,000 for fo down-river industrial centers, in 36.6 year-end flood. In an interesting a dress, he told of the work of the Ame can Army Engineer units along the ba tlefronts of the world.

The Engineers Club, of Mobile, Al at its regular meeting last month, elect the following officers for the year 194 Louis D'Olive was elected presiden W. W. Porter, vice-president; E. Schettler, secretary-treasurer; Leon La sen, director of Public relations, an J. C. Brown, director of membership.

The Engineers' Club of Vicksbur Miss., at its annual meeting, elected th following officers: James E. Sander president; T. E. Stepan, vice-presiden E. H. Courtney, secretary-treasure D. O. Cole, director of administratio and finance; P. E. Cunningham, direct of professional and educational activ ties; Samuel B. Shields, director of pu lic relations and membership; Bert Lin ley, director of welfare, and A. E. Dea director of entertainment.

Engineers at Springfield, Ill., hear

4 WAYS to get more service from WIRE ROPE

wire rope is tough. It can stand up to the t rigorous service—and ask for more.

ut that's no reason to abuse it. With a e care, by applying a few simple rules, you get a tremendous amount of extra service n your rope.

Break it in with light loads

For example, when breaking in a new e, don't slam on full power and speed right the bat. Begin with fairly light loads. erate at moderate speed. Give the strands the rope a chance to seat down snugly and iformly upon the core, so that each strand arrying its fair share of the load. This way, rope will assume its proper "constructional etch" without damage, and you'll be assured better spooling and easier handling through-t the entire life of the rope.

Treat it with consideration

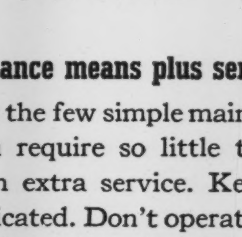
After the rope is broken in, you can safely e whatever speeds and loads it was designed r. But don't be unnecessarily rough, even en. A smooth, gradual application of power just as efficient as slamming into the load with a jerk. The same is true of braking. It's the heavy jerks and surge loads that beat the guts out of a piece of rope. Nine times out of ten these can be avoided without losing time.

3 Know your rope

For example, if you're using a flexible 8-strand rope for high-speed work, don't overload it. This rope is built to withstand bending fatigue and fast operation—not for heavy hogging lifts. The opposite is true of heavy-duty 6-strand rope. Lift with it—but don't try to break speed records.

4 Right maintenance means plus service

Don't neglect the few simple maintenance precautions which require so little time yet return so much in extra service. Keep your rope properly lubricated. Don't operate it over sheaves that are abraded, damaged, or out of line. Fasten clips in the approved manner. Cut off a short length from the drum end of your rope from time to time so that "grief spots" are relocated over sheaves and drums.



ire rope is now a war weapon. Its proper use is a service to your untry and to yourself. If you want good, dependable rope, and iendly service, get in touch with the Bethlehem Wire Rope distri-utor in your territory. He's always ready and willing to serve you.

BETHLEHEM
STEEL

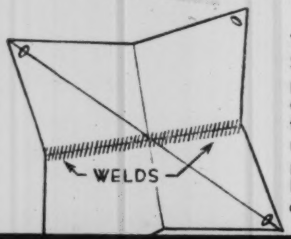
Bethlehem Manufactures Wire Rope for all Purposes

MORRISON *Welded Steel* **PILE SHOE**

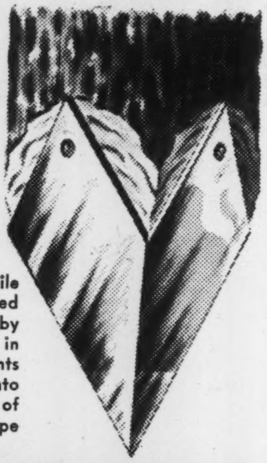
Easy to Apply—Fully Guaranteed!

SPEEDS UP DRIVING
Stops Brooming and Splitting

MAXIMUM STRENGTH *with* **MINIMUM WEIGHT**



The Morrison Welded Steel Pile Shoe is slipped over sharpened pile and fastened in place by driving nails through holes in four wing points. Wing points may be easily hammered into position (without danger of breakage) to conform to shape of pile.



MORRISON **METALWELD PROCESS** *Inc.*
1437 BAILEY AVE. BUFFALO, N. Y.
14 E. JACKSON BLVD. CHICAGO, ILL.

ASPHALT for AIRPORT RUNWAYS

Adequate landing fields are urgently needed. Safe, all-weather Asphalt runways can be laid quickly. In most instances local material can be used, which further speeds up the work, and reduces the cost of Asphalt construction.

Airports built now for training and other war measures will also be an asset to your community after they are no longer needed for war.

Wherever Standard Oil Asphalt products are sold, there is an Asphalt Representative who can give you full information about these and other uses of Asphalt. Write . . .

STANDARD OIL COMPANY (Indiana)
910 SOUTH MICHIGAN AVENUE, CHICAGO

two interesting talks on the Alcan H
way recently, when Lieut. Col. R.
Schilsky, of the U. S. Engineer Co
gave an illustrated talk before the
nois Association of Highway Engine
and Harold W. Richardson, West
editor of Engineering News-Record,
dressed a special meeting of the Cen
Illinois Section, American Society
Civil Engineers, on the same subject.

A War Time Conference of
Minnesota Federation of Engineeri
Societies was held last month. The
nual meetings of the Minnesota As
ciation of Professional Engineers a
the Minnesota Engineers' & Surveyo
Society, which are constituent societ
of the Federation, were held at the sa
time. Among the feature subjects d
cussed at this meeting was the Ale
Highway; Steel for Factories by t
Carnegie-Illinois Steel Corp.; Engine
ing Education in War Times, by Samu
C. Lind, Dean of the Institute of Te
nology, University of Minnesota; Late
Developments in Plastic by the Bakeli
Corporation of Chicago; Great Northe
techni-color movies of Railway Tran
portation in the Northwest; Wire a
Wire Rope Manufacture and Testin
by Jones & Laughlin Steel Corp.;
techni-color picture taken undergrou
by the Ingersoll-Rand Co. of the Co
tinental Divide Tunnel; Air Transport
tion, by the chief engineer of the Nort
west Air Lines, and War Time Activiti
of the Corps of Engineers, by Lieut. Co
Hibert M. Hill.

There was a registration of 570. Th
name of the Minnesota's Federation o
Architectural Engineering Society wa
changed to the Minnesota Federation o
Engineering Societies, the architects hav
ing dropped out of the organization.

Officers elected for the ensuing yea
by the Minnesota Federation of Engineer
ing Societies were: Leonard N. Thomp
son, president; Charles Foster, first vice
president; C. A. Herrick, second vice
president; Glenn B. Lerch, third vice
president, and Myron L. Jones, treasurer.

The officers elected by the Minnesota
Association of Professional Engineers
were: R. R. Herrmann, president; N. T.
Rykken, vice-president; S. L. Stolte,
secretary, and Ray Deegan, treasurer.

Officers elected by the Minnesota Sur-
veyors & Engineers Society were: Myron
L. Jones, president; H. G. Nicholson,
vice-president, and Walter Schultz,
secretary-treasurer.

The Engineers Club of Philadelphia,
at its regular monthly meeting in Febru-
ary, presented the Charles E. Dillin
Award to three of its junior members.
The prize, named in honor of the club's
first secretary, was given to Clayton B.
Cramer, Philadelphia Navy Yard; Her-
bert J. Bernstein, Cramp's Shipbuilding

Move Your Scrap TODAY

Your Scrap is Needed...Now!

More scrap...more scrap...is the Victory cry of the mighty steel mills. Miles of useless steel tracks, and obsolete metal structures, too, are potential war material. Koehring Cranes are helping gather scrap, raze structures, load and handle scrap in the scrap yards. The hungry steel mills will soon transform your scrap into much needed steel. Have you a scrap pile . . . are you collecting scrap every day . . . every piece of scrap, large or small, is necessary. Help all you can . . . today ...get your scrap moving into the scrap...now.

KOEHRING CO · *Milwaukee, Wis.*

KOEHRING HEAVY DUTY

HEAVY-DUTY CONSTRUCTION EQUIPMENT

BITUVIA
Road Tar

for Essential Maintenance Work

★ Maintenance of main highways and principal feeder roads is the big job of the year for the road building industry. BITUVIA offers distinct advantages for maintenance work. It is quickly applied, penetrates deeply, binds firmly, and has a resilient, skid-resistant surface that contributes to safe driving and longer tire life. Standard grades to meet all Federal, State, County and Municipal specifications. . . . REILLY engineers will be glad to assist in the preparation of your application to the P.R.A. for your requirements of BITUVIA in essential maintenance construction.

PLASTUVIA CRACK FILLER — Plastuvia is a waterproof filler which bonds firmly to brick and concrete, filling and sealing cracks and openings to prevent water damage. Will not flow or pull in summer, nor chip in winter.

Reilly
COAL TAR PRODUCTS

Write for pocket-size BITUVIA manual.

REILLY TAR & CHEMICAL CORPORATION
Merchants Bank Bldg., Indianapolis, Ind.
500 Fifth Ave., New York 2513 S. Damen Ave., Chicago
★ 17 PLANTS to Serve the Nation

BELMONT
IRON WORKS
PHILADELPHIA ROYERSFORD EDDYSTONE

Fabricators Contractors
Exporters

STRUCTURAL STEEL
BUILDING & BRIDGES
RIVETED—ARC WELDED
BELMONT INTERLOCKING
CHANNEL FLOOR

Main Office
Philadelphia, Pa.
44 Whitehall St.
New York Office

PILE HAMMERS
and
EXTRACTORS
HOISTS—DERRICKS
WHIRLERS

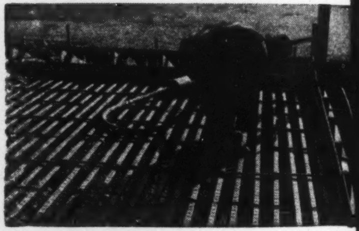
Write for descriptive catalogs
McKIERNAN-TERRY CORP.
13 Park Row, New York

Yard, and Robert Diskant, of the
York Shipbuilding Co.

THE EIGHTH ANNUAL Highway
neering Conference was held in
querque, New Mexico, the end of
month, and was well attended in
of wartime transportation condi
The conference was jointly spons
by the University of New Mexico's
partment of Civil Engineering, the
Highway Department, and the New
ico Chapter of the American Societ
Civil Engineers. Capt. H. H. Allen
the U. S. Engineers, read a paper
"Design of Military Airport Runwa
L. C. Campbell, state highway de
ment research engineer, discussed
subject of "The Effect of Capillary
ture on Highway and Airport Run
Soils"; C. L. Etter, associate agri
tural engineer with the U. S. Engine
discussed "Possibility of Dust Contro
Airports by Vegetation"; and John R
tilla, chief of the Engineers' testing
oratory, read a paper on the laborat
and its participation in the war eff
A film was run covering various act
ties of war construction.

GORDON MCL PITTS was re-elec
president at the annual meeting of
Royal Architects Institute of Cana
held at McGill University, Montreal.

Better Work—
FASTER



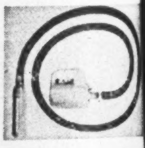
WITH VIBER VIBRATIO

Viber Vibrators, proved on scores of big job
are making history today on war constructio
because they *speed up concrete work.* New mode
are completely interchangeable for gas, electri
and air operation.

There is a Viber Vibrator specifically designe
for every type of concrete construction.

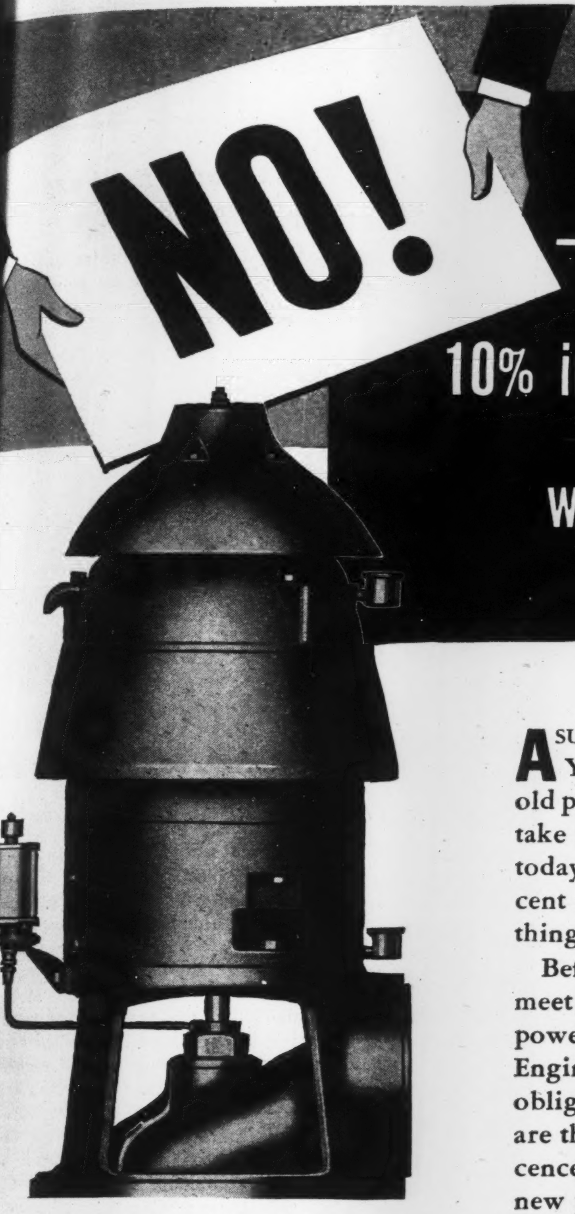
• FLEXIBLE
ELECTRIC VIBRATOR

Made in 2⅛" and 3" diameter with 12 ft. and 21 ft. flexible shaft. Complete interchangeability — Flexible Casings, Cores, Vibrators. Universal type motor. Built-in protective "ground."



NEW CATALOG describes latest line of Viber Vi
brators. Send for your copy today

VIBER COMPANY
726 SO. FLOWER STREET
BURBANK, CALIFORNIA



-you wouldn't accept a 10% increase in power cost without a protest

FAIRBANKS-MORSE TURBINE PUMPS

The F-M line offers complete range of capacities from 35 g.p.m. to 4000 g.p.m., for electric motor, Diesel or gasoline engine, or steam turbine drive. Open or closed impellers. Oil or water lubrication.

A SUDDEN boost of 10 per cent in power rates? You'd call it ridiculous—but many ten-year-old pumps of certain types, *even if as good as new,* take 10 per cent greater toll at the meter than today's Fairbanks-Morse models! And a 10 per cent reduction in power consumption is anything but ridiculous—especially now.

Before you arrange for increased power to meet heavier production schedules, eliminate power waste. Your resident Fairbanks-Morse Engineer can tell you quickly—without cost or obligation—whether or not the pumps you have are the types that exact the penalty of obsolescence. You may discover, as others have, that new pumps would solve your power problem today—and your cost problem tomorrow. Use your priority to buy for today with an eye on tomorrow's cost sheets. Write Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago, Illinois.

ARMY
ARMY
ARMY
NAVY
F M

FAIRBANKS-MORSE

DIESEL ENGINES
PUMPS
MOTORS
GENERATORS
SCALES

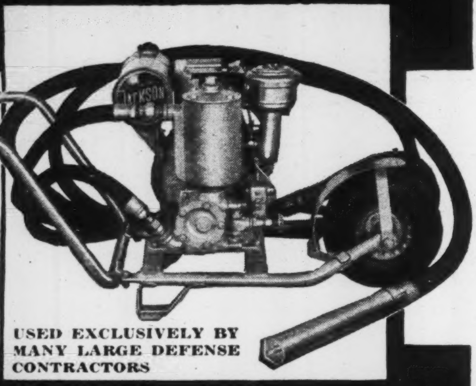
WATER SYSTEMS
FARM EQUIPMENT
STOKERS
AIR CONDITIONERS
RAILROAD EQUIPMENT

F M Pumps

. . . If you want to make speed profitably . . . GET DEPENDABLE EQUIPMENT . . Buy the Fast . . .

JACKSON Hydraulic Concrete Vibrator

DESIGNED TO "TAKE IT" 3 SHIFTS A DAY—EVERY DAY



USED EXCLUSIVELY BY MANY LARGE DEFENSE CONTRACTORS

- Automatic pressure lubrication—requires no attention.
- 34-ft. hose—2¾" vibrator head.
- Adjustable frequency to 6800 R.P.M.—submerged in concrete.
- Powerful gas engine—4.7 H.P.
- Long-lived, ball-bearing, rotary, hydraulic pump.

ELECTRIC TAMPER & EQUIPMENT CO.
LUDINGTON, MICHIGAN

Simplify and speed-up your work in STRUCTURAL DESIGN

with the workable methods of stress calculation in this newly-revised Hool and Kinne book

HERE is help in checking your methods, looking up special problems, expediting your work at every turn with the many formulas, illustrated methods, standards, and data, arranged especially for the engineer in this book. One of the well-known Hool and Kinne structural engineering books widely used in its first edition, now it is an even more valuable work, revised to bring you latest standards and improved methods—in every way, an up-to-date, handy tool for the busy structural engineer.

Just out! Revised Second Edition

STRESSES IN FRAMED STRUCTURES

Editors-in-Chief
GEORGE A. HOOL and
W. S. KINNE

Revised by R. R. ZIPPRODT
Consulting Engineer
and GEORGE C. ERNST

642 pages, 6x9, 410 illustrations, 170 tables, $5.00

THIS book fully explains modern methods for the determination of stresses in beams, roof trusses, bridge trusses, lateral trusses, and rectangular tower structures. Illustrative problems—worked out—solutions of typical designs, together with the tabulated material given, are a source of real help to those who want general brushing up or quick answers in this field. This clear treatment of modern standards and practical methods to meet specific structural problems will be valued as a time-saving and dependable tool.

10 DAYS' FREE EXAMINATION

McGRAW-HILL BOOK CO., Inc., 330 W. 42nd St., N.Y.C.

Send me Hool and Kinne's—Stresses in Framed Structures for 10 days' examination on approval. In 10 days I will send $5.00, plus few cents postage, or return book postpaid. (Postage paid on orders accompanied by remittance.)

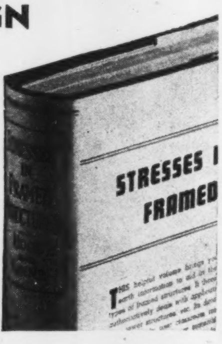
Name ....

Address ....

City and State ....

Position ....

Company .... NR. 3-11-43



Put these practical aids to work for you:

- **86 pages** of methods for determination of moments and shears in beams and trusses due to fixed and moving loads.
- **100 pages** on determination of stresses in all modern types of bridge trusses for simple spans.
- **75 pages** on deflection of trusses, stresses in redundant members and secondary stresses.
- **complete** analyses of statically indeterminate frames by the slope deflection method.
- **78 tables** giving stresses in standard frames for a great variety of loading cond.tions.

NEWS OF THE WEEK

(Continued from p. 91)

Bill would limit enginee posts to licensees

Only licensed engineers would be proved for appointment as county way superintendents, county engineer city engineers under terms of a bill troduced recently in the New York S Senate by Senator Thomas C. Desm of Newburgh.

"This bill," he said, "provides that person hereafter appointed county sup intendent of highways, county engine city engineer or to any similar posit in New York State shall be a duly censed professional engineer. At pres a number of laymen are employed these technical positions. The propo law would not affect those who hold s positions on June 30, 1943, and are office continuously thereafter."

Kentucky county tests right to tax river transpo

The Campbell County, Ky., Board Equalization recently filed a valuat assessment of $558,800 against three ri transportation companies, thus setti the stage for a court fight to determi whether a county can assess transpo companies for use of the Ohio Riv within the county's boundaries.

County Attorney Stanley Moebus e plained that the assessments were dete mined by dividing the assessed valuatio of the companies by the mileage of riv front in Campbell County. The asses ments were made against the Islan Creek Fuel & Transportation Compan of Huntington, W. Va., which was as sessed $252.400; the Ohio-Kanawh Transportation Company of Cincinnat $154,000, and the Ohio River Compan of Cincinnati, $152,400.

Attorneys for the three companie charged that the assessment was illega because the companies own the barge and haul their own products; and th right to tax personal property on a navigable stream did not exist.

Mexico City abandons air raid shelter plans

Plans under consideration by the city government of Mexico City for the establishment of air raid shelters as par of a public works program have been abandoned, according to Mayor Javier Rojo Gomez.

Mr. Gomez said that city engineers

I'll Guard the home front

—against the forces of GENERAL WEAR

"HARCOTE" is ready! Ready to protect softer steels against the ravages of wear—to help you keep machinery on the job—now—when replacement parts are so difficult to obtain.

P&H "Harcote" is a hard surfacing electrode—both hard and *tough!* It's ideal for refacing parts subject to severe wear and abrasion, such as shovel teeth, scraper blades, farm implements, sand and rock handling equipment, and many other applications on carbon steel, low alloy and high manganese surfaces. "Harcote" is just one of the family of P&H Alloy Electrodes which answer every welding need. P&H representatives will gladly assist you. Or write us for literature and procedures.

Ask also for information about P&H Arc Welding Machines.

P&H *Alloy* ELECTRODES

ARMY E NAVY

A new star has been added to P&H's award for excellence in war production.

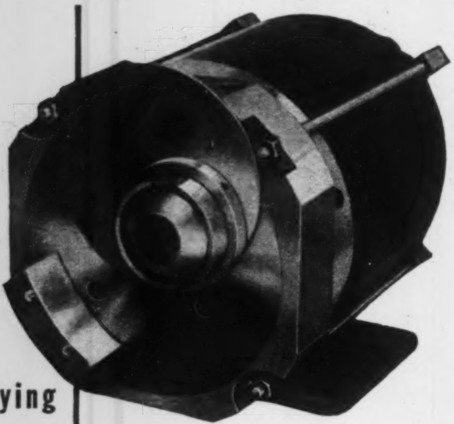
General Offices: 4404 W. National Avenue, Milwaukee, Wisconsin

HARNISCHFEGER CORPORATION

WELDING ELECTRODES • MOTORS • HOISTS P&H ELECTRIC CRANES • ARC WELDERS • EXCAVATORS

Canadian Distribution: The Canadian-Fairbanks-Morse Co., Ltd.

THE LAZAN MECHANICAL OSCILLATOR



for studying the **DYNAMIC** mechanical properties of **METAL, PLASTICS** and **TIMBER**

The Lazan Mechanical Oscillator is a vibration-inducing device for studying the dynamic mechanical properties of metal, plastics, and timber specimens or structural units. It is a self-contained, versatile, inexpensive, and easy-to-operate unit which has a total weight of 50 lb including its 25-lb driving motor and an overall size of 9 in. by 6 in. by 6 in. It is capable of exciting forces exceeding ± 2000 lb and torques greater than ± 10000 in-lb. On special order oscillators of this type may be built as small as 5 in. by 3 in. by 3 in. and weighing about 10 lb including the motor.

Write for complete information on the Lazan Oscillator. Baldwin Southwark Division, The Baldwin Locomotive Works, Philadelphia. Pacific Coast Representative, The Pelton Water Wheel Co., San Francisco.

BLW THE BALDWIN GROUP

BALDWIN SOUTHWARK

Division THE BALDWIN LOCOMOTIVE WORKS, *Philadelphia, Pa.*

MITCO
OPEN STEEL FLOORING

Pressure Formed
90% Open Area
Easy to Install

Hendrick Manufacturing Company
45 Dundaff Street, Carbondale, Pa.

BAILEY METERS AND CONTROLLERS

FOR SEWAGE TREATMENT AND WATER SUPPLY . . .

● Venturi Tubes, Weirs, Flumes, Nozzles and other primary elements; Mechanically and Electrically operated Registers and Complete Automatic Control Systems.

BAILEY METER COMPANY
1029 IVANHOE ROAD • CLEVELAND, O.
Bailey Meter Co. Ltd., Montreal, Canada

have arrived at the conclusion after l and intensive study of the question t such shelters in other countries are u less and their establishment in the Me can capital would be a waste of mone He added that the money that the c and federal governments had intended spend for air raid shelters in the capi will be diverted to the manufacture a purchase of water materials.

Ontario sees increased power demand for 1943

The Hydro-Electric Power Commissio of Ontario, Canada, expects a net i crease in demand of between 60,000 an 120,000 hp. over present demand, b December, 1943, for the Southern On tario Systems, Dr. T. H. Hogg, chairma and chief engineer to the Commissio said in a recent speech.

Addressing a special joint session o the Ontario Municipal Electric Associa tion and the Association of Municipa Electrical Utilities in Toronto, Dr. Hogg said the range in primary demand wi run between 2,017,000 to 2,077,000 hp He added that the dependable genera ing capacity, including additions to b made during the year, would be 2,030, 000 hp., although under favorable wate conditions this figure might reac 2,070,000 hp.

On the basis of average demands and dependable capacity, a shortage of 13,000 to 20,000 hp. was indicated for next winter, although the engineer said that on a total power output of over two million horsepower, estimates carried to this degree could be approximate only.

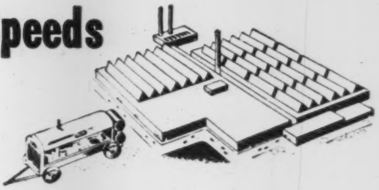
"Restrictions of power use, now in effect in Ontario, and voluntary restrictions of domestic power use, must continue," Dr. Hogg said.

Discussing plans for the coming year, he said the Commission expects to bring into use 65,000 hp. from the new De Cew Falls station, and that improved conditions created by the new Niagara Falls weir would add about 20,000 hp. to power generated at the Niagra Falls plants. During 1942, the Commission brought into use 129,000 additional horsepower, including 75,000 hp. purchased from the Maclaren and Beauharnois Companies in Quebec and 54,000 generated at the new station at Barrett Chute on the Madawaska River.

Plan construction of 97 roads for access to timber

To open up more than 15 billion board feet of hitherto inaccessible timber, as well as minerals needed for war uses, the U. S. Department of Agriculture's Forest Service has been requested to con-

r Tough Jobs . . . Long Runs . . . High Speeds



Specify Climax ENGINES

r Portable or Stationary Power on Your Construction Projects

★ For easily moved, quickly installed MECHANICAL Power to expedite war production, get Climax "Blue Streak" Engines. For self-contained, instantly available ELECTRIC Power, get Climax Generating Sets.

The power units are 4, 6, 8 and 12-cylinder internal combustion engines, 8 to 435 hp., burning natural gas, butane, gasoline or other fuels. Changeover is quick and easy with outside-located fuel accessories. The generating sets consist of an engine direct connected to an AC or DC generator. These are available in over 100 sizes from 300 watt to 312 kva.

Simplicity and flexibility of operation, dependability and no-trouble running, year after year have earned Climax products a favorable reputation for construction work. They make it possible for you to take your power with you; drive a limitless variety of equipment; and be entirely free from the worries of purchased power.

Write for details on how Climax can build you power units "tailored" to meet your individual requirements. Write to address below—Dept. S.

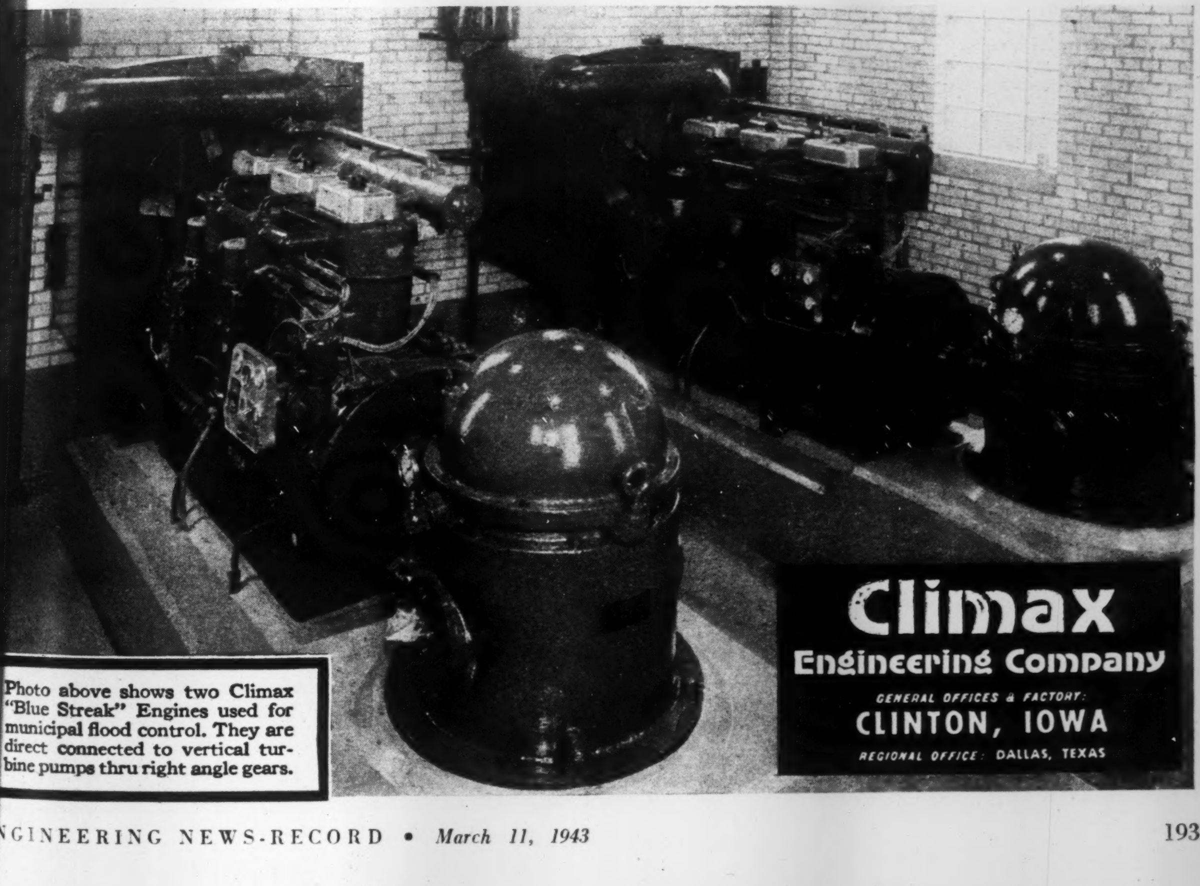
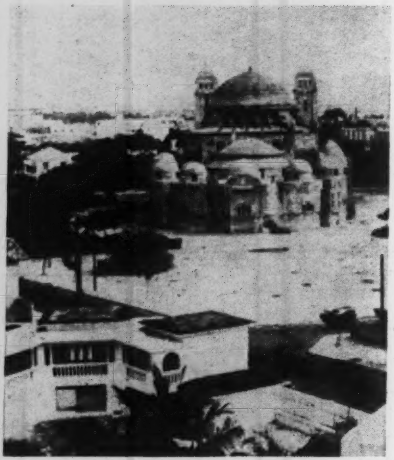


Photo above shows two Climax "Blue Streak" Engines used for municipal flood control. They are direct connected to vertical turbine pumps thru right angle gears.

Climax
Engineering Company
GENERAL OFFICES & FACTORY:
CLINTON, IOWA
REGIONAL OFFICE: DALLAS, TEXAS



DAKAR—WEST AFRICA

400 Miles

South of the Sahara

When our troops swung into Dakar, they found Layne Wells and Pumps on the job, producing millions of gallons of water daily. The Dakar installations had been made under the direction of Layne engineers and are identical with the famous high efficiency, long lasting Layne Wells and Pumps now serving your own local cities and industries.

Layne Wells and Pumps are in use throughout the African War Zone. They were chosen from a field of world wide competitive makes. The reasons for their selection are quite obvious; more skilfully designed, more ruggedly built and more efficient in operation. In war as in peace, their dependability has never faltered.

Tremendous quantities of well water is an absolute war necessity and today hundreds of speedily installed Layne Wells and Pumps are serving aircraft makers, ordnance works, munition factories, chemical plants, ship yards, flying fields, troop training areas and navy yards. Present production is now nearly 100 percent for the war needs, but every effort is being made to keep private and municipal installations in operation.

For literature, catalogs, folders, bulletins, etc., address LAYNE & BOWLER, INC., Memphis, Tenn.

LAYNE
PUMPS & WELL WATER SYSTEMS

Affiliated Companies

Layne-Arkansas Company	Stuttgart, Ark.
Layne-Atlantic Company	Norfolk, Va.
Layne-Bowler New England Corp.	Boston, Mass.
Layne-Central Company	Memphis, Tenn.
Layne-Northern Company	Mishawaka, Ind.
Layne-Louisiana Company	Lake Charles, La.
Louisiana Well Company	Monroe, La.
Layne-New York Company	New York City
Layne-Northwest Company	Milwaukee, Wis.
Layne-Ohio Company	Columbus, Ohio
Layne-Texas Company	Houston, Texas.
Layne-Western Company	Kansas City, Mo.
Layne-Western Co. of Minn.	Minneapolis, Minn.
International Water Supply, Ltd.	London, Ont.

WORLD'S LARGEST WATER DEVELOPERS

struct or improve 97 roads, many of them in the wildest mountain country of the west.

Seven of the new roads have already been completed. They will provide access to mining operations for the production of chrome, tungsten, or other strategic materials and to stands of timber that previously could not be logged because of inaccessibility or lack of adequate transportation facilities. Most of the roads are in rough, mountainous country, presenting difficult problems of construction for even simple, low standard roads.

The 97 access road projects have been approved by the War Production Board and funds amounting to $2,694,963 have been allotted by the Public Roads Administration. These roads will include 33 timber access roads for a total of 558 miles, and 64 mine access roads totalling 652 miles.

Allotment for roads by states are: Alabama, $17,200; Arizona, $66,300; California, $661,345; Colorado, $77,500; Idaho, $486,730; Minnesota, $42,320; Montana, $195,943; Nevada, $91,850; New Mexico, $160,300; Oregon, $463,175; Utah, $17,400, and Washington, $414,900.

BRIEF NEWS

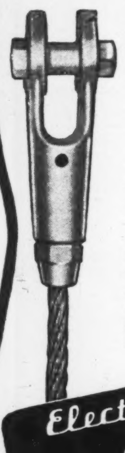
ALTHOUGH the approaches are not finished, a new bridge across Gulpha Creek to facilitate traffic to aid defense plant southeast of Hot Springs, Ark. has been opened to traffic.

STREET railway tracks in Staunton, Va. are to be removed and become the property of the Metal Reserve Corp., city manager W. L. Hall announced recently.

CLOSURE has been made on the Norfolk Dam, and the creation of the largest clearwater mountain lake in the South has started. Water already has spread out over the bottom just above the dam, and the swift river is backed up four and a half miles and is gaining space rapidly. The lower part of the dam basin has been cleared to take care of water, and clearing work above is moving rapidly. The closure was made when the South side of the dam was completed recently.

AN INVESTMENT of about $825,000 has been arranged by the Mexican government for construction of a military city at Tampico, according to General Anacleto Guerrero, commander of the Tampico, army zone. Work is scheduled to begin within 60 days.

THE VILLAGE of Millington, Tenn., will have a modern sewerage system under



TIGHT BITE

..holds tigh

ELECTROLINE-FIEG
Wire Rope Connectors hol with a "Bulldog Grip" be cause their special desig gives them a tighter bite They are easy to instal streamlined and preven dangers from undamped vibrations which cause crystallization, frayed cables and failures. Full rated cable strength in every connection.

Prove to yourself that they are better and why many leading wire rope users have made them standard on jobs where performance must not fail. Write today for complete details and the booklet, "Positive Grip".

Electroline FIEGE CONNECTORS

Electroline Company

South La Salle Street Chicago, Illinois

Compact! Powerful! Sa

DISTRIBUTABLE CONTROLL POWER

with ALL STEEL HAND HOIST

SEATTLE, U.S.A.

★

Money Has Been Saved on These J

1200' assembled pipe (132 Tons) were lowere to bed of Mississippi at St. Paul with 9—5-Ton Beebes, three lines to each hoist throug blocks.

Hudson River Bridge sidewalks were laid i sections with 32—5-Ton Beebes.

Longest wooden trusses in world were in stalled with ONE 5-Ton Beebe after powe hoists proved impractical.

★

When raising, lowering, or placing costs by p are a serious problem, the answer is the number of Beebe Bros. All Steel Hand H MANNED IN UNISON. Available in 2, 5 and Ton sizes. Sold through leading dealers in trade centers. List of dealers sent upon request

BEEBE BROS., 2720 6th Ave. S., Seattle, U.S

★

"THE STRONGEST GEARED POWER FOR ITS WEIGHT IN THE WOR

Engineers . . .

A number of interesting, well paid positions open with Fairchild Aircraft

THIS LONG ESTABLISHED major aircraft company now has many positions in its Engineering Department open to engineers with previous aeronautical experience and to engineers who may not have had such experience.

Fairchild needs aeronautical, structural, mechanical and electrical engineers.

It needs architects, draftsmen, machine designers and others similarly qualified.

These positions are highly interesting, confidential, have to do with the unique development of military cargo-carrying aircraft. They offer splendid chances for advancement, financially and otherwise.

Candidates should have at least a high school education and 5 years of actual engineering or drafting experience. Age range 28 to 50. They must be American citizens. Those now employed at their highest skills in war work will not be considered.

In replying please send photo (any kind) and give details of experience, education and general background. Replies will be treated confidentially.

Address: Engineering Department A, Fairchild Aircraft, Hagerstown, Md.

FINE GEARS
of
All Types and Sizes

pur Gears—⅛ in. to 30 ft. in diameter
evel Gears—⅛ in. to 13 ft. in diameter
piral Gears—⅛ in. to 10 ft. in diameter
orm Gears in any practical size.
Fast Delivery—Fair Prices
HE EARLE GEAR & MACHINE CO.
717 Stenton Ave. Philadelphia, Pa.

EARLE GEARS

Fast, Dependable
SHOVELS, CRANES
DRAGLINES, BACK HOES
Crawler or Truck—Gas or Diesel
10 Models of ¾-⅝-½-⅜ cu. yd.
THE **BYERS** MACHINE COMPANY
RAVENNA, OHIO
DISTRIBUTORS THROUGHOUT THE WORLD

DIAMOND CORE DRILLING CONTRACTORS

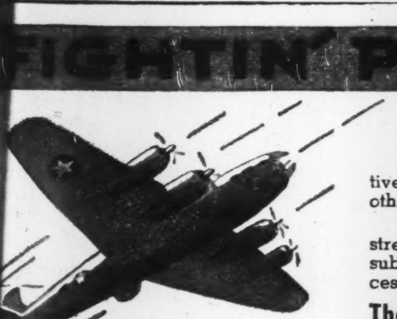
◆

FOUNDATION TESTING
Dams, Heavy Structures, etc.
STAGE SECTIONAL PRESSURE GROUTING
Contract or Rental

◆

MFR'S DIAMOND & SHOT CORE DRILLS GROUT MIXING MACHINES, PACKERS AND GROUT PUMPS
MOTT CORE DRILLING CO.
Huntington, W. Va.

FIGHTIN' PUNCH
of a Flying Fortress



American flying fortresses are effectively armored beyond comparison with other combat planes.

So too, Owen Buckets embody extra strength and re-enforcement at all points subject to particularly hard wear or excessive strains.

The OWEN BUCKET Co. Breakwater Ave., Cleveland, Ohio
Branches: New York, Philadelphia, Chicago, Berkeley, Cal.

OWEN BUCKETS

A MOUTHFUL AT EVERY BITE

BROTHER, THIS IS WAR!

Save Time for Yourself and Your Engineers!
USE ARKWRIGHT TRACING CLOTHS!

Arkwright Tracing Cloths save you time because their special-processed surfaces take ink or pencil with equal ease . . . erase without smudging. Arkwright Tracing Cloths also save engineers time. That's because they have such a high degree of transparency that every detail reproduces clearly and sharply . . . making it possible to read blueprints easier, faster, and with less danger of making errors. Save time! Use Arkwright Tracing Cloths! Arkwright Finishing Company, Providence, R. I.

Arkwright TRACING CLOTHS
AMERICA'S STANDARD FOR OVER 20 YEARS

DE LAVAL STEAM TURBINE CO.
TRENTON, N.J.

Manufacturers of
STEAM TURBINES . . . HELICAL and WORM GEARS . . . PUMPS: Centrifugal, Propeller, Clogless, Mixed Flow, Rotary Oil . . . Pump Priming Systems . . . CENTRIFUGAL BLOWERS and COMPRESSORS.

DRILLING CONTRACTORS
DIAMOND AND SHOT CORE BORINGS—DRY SAMPLE BORINGS
•
Foundation Testing for Bridges, Dams and All Heavy Structures
Also
Manufacturers of Diamond and Shot Core Drills, Accessories and Equipment
•
SPRAGUE & HENWOOD, Inc.
SCRANTON, PA. Dept. E U. S. A.

plans approved in Washington, accord to E. W. Hale, chairman of the Sh County Commission. The municipal now has no sewerage system, and with current increase in its population been hard pressed to find means of posing of material. The contempla work would cost $105,000.

About 100,000 ft. of flexible w pipe, developed by the Armco Drainag Products Association as a substitute steel has been installed in drainage c verts, storm sewers and conduits und highways and at army camps, naval-s tions, airfields and ordnance plants, War Production Board Conservation D vision said recently.

The War Production Board has questested Milwaukee, Wis., city officia to empower Walter Swietlik, comm sioner of public works, to negotiate the removal of the remaining street c tracks buried in city streets. The WP reportedly proposes either to pick up t rails itself or to have the city do it an share the cost. About 1,100 tons of ra already have been removed but an es mated 2,300 tons still remain beneat the pavements.

A Bill has been introduced in th Oregon State Legislature that would r quire contractors on state and municip projects to given Oregon-produced buil ing materials preference. The measur would require contractors to demand al ternate bids in all cases where Oreg construction materials are available an to use the Oregon products when the price is no more than 5 per cent highe except in the case of sand, gravel, ce ment and other common materials, whic would have preference over materials o equal price.

The Largest map ever made of Mex ico, result of 20 years of work by Pedr G. Sanchez, a government civil enginee has just been completed by the Mexica Ministry of Agriculture. The first cop of the map was presented to the Mexica Society of Geography and Statistics.

Work orders issued by the Californi State Division of Highways for constru tion and maintenance operations reache a total of $55,420,800 during 1942. C. H Purcell, director of public works an nounced recently.

Construction of a hospital for the ex clusive use of about 14,000 employees o the Mexico City government has bee approved. Guillermo Aguilar Alvarez, di rector general of the city public work department, has been assigned to dra plans for the institution, which will cos an estimated $210,000.

CONSTRUCTION REPORTS

Compiled by Business News Department—Engineering News-Record, 330 W. 42nd St., New York
ELSIE EAVES, Manager *SCOTT McLEOD, Statistician*
(Daily service also available—Write for details)

Location of ENR Correspondents

Symbols and Abbreviations Include

Federal Government
Project of $500,000 or over
Engineering News-Record
Engineering News-Record Construction Daily
-MArchitect — Engineer-Management type of contract.

Projects—By Size

struction projects here reported cover the ted States and Canada, are of these mini- n sizes or larger; water supply, earthwork, erworks, $15,000; other public works, $25,- ; industrial buildings, $40,000; other build- s, $150,000.

Classes of Construction

(Named in order of Listing)

ter Supply
vers, Waste Disposal
dges, Grade Cross'gs
eets & Roads
rthwork, Waterways
Unclassified
Latin America
Public Buildings
Commercial Buildings
Industrial Buildings

Stages Reported

OPOSED: (except Streets & Roads):

DS ASKED (new announcements only. For calendar, see also preceding issues of R);

W BIDDERS: On jobs below $500,000 value low bidder news will be the final reports lished on the projects involved except re award is not made to the low bidder. this case, a supplementary contract award ort will be published.

NTRACTS AWARDED: Except awards to bidders previously reported in low bidder ge.

Dates shown are of issue in which last vious report was published.

te: To comply with censorship requirements, dresses on some reports are being gen- ralized. Data which would reveal the purpose the improvements and the size are with- ld. The name of contractor and general a are reported.

WATER SUPPLY

OPOSED WORK

★†**District of Columbia**—U. S. Eng., McMillan Station, postponed indefinitely con- uction Dalecarlia pump, sta. $918,000; avity main Dalecarlia $671,000; Fort Reno servoir $500,000. CD 11/23—ENR 11/26.

Mass., Belmont—Bd. Selectmen, Town Hall, ter sys. Over $15,000.

Mass., Hanover—Bd. Water Comrs., J. W. al, chn., water sys. $20,000. S. M. Ells- rth, 6 Beacon St., Boston, engr.

Mass., Milton—Bd. Selectmen, Town Hall, termains, $15,000.

†**Mo., Crocker**—City, completing WW and werage sys., Project Mo. 23-263. $50,000. WA.

†**Miss., Jackson**—City Water Works Dpt., F. Wade, supt., filter plant addn., con- ructing 1 m.g.c. clear water reservoir and settling basin, $269,000. **FWA.** Black & atch, 4706 Bway., Kansas City, Mo., engrs. D 2/25—ENR 3/4.

N. M., Alouquerque—Exten. water lines be- een University and Burta Park reservoir. 06,000. Applied for FWA gr.

Tex., Fort Worth—City, c/o S. H. Both- ell, mgr., WW imprvs., water reservoir with ,000 cu. yd. earthwork and concrete gravity alls, with 11,410 ft. 30 in. c.i. connecting pe, etc. $252,430. Applied to FWA. Freese Nichols, Capps Bldg., Fort Worth, engrs. D 2/26—ENR 3/4.

BIDS ASKED

Bids Asked March 23

†**Maryland**—Federal Works Agency, 601 State Planters Bank Bldg., Richmond, Va., addnl. WW facilities Md. 18-135, Baltimore Co. $81,200.

Bids Asked

★†**Tex., Houston**—City, J. Edy, mgr., water supply facilities, incl. three 200 kva., 12-440 sub-station transformers, 1 single panel switchboard, etc., Tex. 41564-F. **FWA.** G. L. Fugate, City Hall, engr. CD 12/22—ENR 12/31.

LOW BIDDERS

Pa., Phila.—C. Director P. Wks., Mar. 1, 12 in. c.i. cement lined pipe, Margaret Lefevre, Thompson and Orthodox Sts., from M. B. and J. B. McHugh, 892 Markoe St., **$36,800.** CD 2/18—ENR 2/25.

Wis., Cudahy—J. F. Keller, city clk., Mar. 2, 2300 ft. 16 in. water main S. Packard Ave., from W. J. Lazynski, Inc., 906 E. Center St., Milwaukee. Bid 1 **$19,562,** Bid 2 alt. **$18,545.** CD 2/18—ENR 2/25.

†**Tex., Pecos**—At office Federal Works Agency, 1309 Electric Bldg., Fort Worth, Feb. 20, water and sewer imprvs., utility sys., alterations and extens., wells, deep well pumps, water pumps, etc., Tex. 41-555, from D. N. Bassett, Monahans, **$38,500.** Bids 2/10 rejected. CD 2/19—ENR 2/25, under LB.

CONTRACTS AWARDED

†**Arizona**—U. S. Eng., 751 S. Figueroa St., Los Angeles, Calif., water distr. sys., Maricopa Co., to Fisher Constr. Co., P. O. Box 4035, Phoenix. Est. under **$50,000.**

†**Kansas**—U. S. Eng., 10 E. 17 St., Kansas City, Mo., water distr. sys., Pratt Co., to Asplund Const. Co., Enid, Okla. Est under **$50,000.**

†**Texas**—U. S. Eng., 231 W. Main St., Denison, addl. facilities water storage, pump. plant, utility yard, sewer, incinerator. Gregg Co., to Campbell & Kay, Tyler, **$100,000-$500,000.**

†**Texas**—U. S. Eng., Fort Sam Houston, WW and sewers, Kinney Co., to Waco Constr. Co., Waco, under **$50,000.**

†**Tex., Amarillo**—City, c/o A. P. Hancock, mgr., Contr. 1, water lines, Tex. 41-569, to Amarillo Bridge Co., Amarillo, **$216,807. FWA.** Bids 2/23, awarded 3/3. CD 3/2—ENR 3/4 under LB.

†**Tex., Amarillo**—A. P. Hancock, city mgr. Contr. 2, drilling, developing deep water well, Tex. 41-569, to Nichols Pipe Co., 3028 Duranzo St., El Paso, **$19,603. FWA.** CD 2/12—ENR 1/21.

†**Washington**—U. S. Eng., 800 3 Ave., Seattle, water supply sys., Clallam Co., to Standard Plumbing & Heating Co., 10 St. and North Shore Dr., Bremerton, under **$50,000.**

SEWERS, WASTE DISPOSAL

PROPOSED WORK

Calif., Santa Clara—Sewage disposal plant. $167,049. E. C. Schott, city engr.

†**Colorado**—U. S. Eng., c/o Postmaster, Denver, sewage disposal plant, reservoir. Under $100,000. Crocker & Ryan, 1st National Bank, Denver, engr.-archt.

†**Connecticut**—Pub. Housing Auth., NHA, 24 School St., Boston, Mass., plans nearing completion disposal plant addn., for housing, Projects Conn. 6011 and 6014. Payne & Keefe, 231 State St., New London, archts. and engrs.

†**Ill., Milan**—City, sewerage sys. $50,000-$65,000. **FWA.**

Mass., Milton—Bd. Selectmen, Town Hall, sewer mains and disposal sys. Over $25,000.

Mass., Needham — Town, Bd. Selectmen, Town Hall, storm and sanitary sewers. $25,489.

†**Mich., Dearborn**—Sewers, incl. 1,900 ft. 60 in. connecting sewer from Dearborn east side interceptor to Detroit city interceptor. $85,000.

†**Ohio**—U. S. Eng., Wright Field, Dayton, sewer lines, Montgomery Co. $300,000.

R. I., Warren—Town, c/o F. Brocher, chn. Sewer Comn., 10 Martin St., sanitary sewers various streets, incl. Wood, Liberty and Water Sts. Over $25,000.

Tex., Brackettville — A. T. Terry, mayor, sewerage sys. $144,000. Applied for FWA funds. J. C. Calhoun, Jr., Houston Merchants Exchange Bldg., Houston, engr.

Tex., Nederlands — M. L. Bronaugh, city secy., sewerage sys. $126,500. Applied for FWA funds. C. P. Smith, Bancroft Bldg., Orange, engr.

BIDS ASKED

Bids Asked March 17

D. C., Wash.—District Comrs., District Bldg., 1300 ft. brick, concrete relief sewer in 19 and C Sts.

†**Pa., Williamsport**—Pub. Bldgs. Admin., North Interior Bldg., Wash., D. C., storm water drainage sys. **FWA.** Extended date. CD 2/10—ENR 2/18.

Bids Asked March 23

†**La., Bossier City**—Pub. Bldgs. Admin., North Interior Bldg., Wash., D. C., storm water drainage. **FWA.**

Bids Asked

†**Texas**—U. S. Eng., 25 St. and Avenue F, Galveston, sewage treatment plant, Solic. 359-43-C53, Harris Co. Over $25,000. Plans deposit $25.

LOW BIDDERS

†**Colo., Denver**—City & Denver Co., City & County Bldg., Feb. 24, sewage disposal plant, from M. E. Carlson Const. Co., 4883 Newton St., **$87,537.** Est. $91,517. **FWA.** Black & Veatch, 4706 Bway., Kansas City, Mo., engrs.

N. Y., Brooklyn—President Brooklyn Boro, Boro Hall, Mar. 4, storm and sanitary sewers Avenues L and K, etc., from Milljay Constr. Corp., 515 Avenue I, **$37,744.** CD 2/25.

†**N. C., Fayetteville**—Pub. Bldgs. Admin., North Interior Bldg., Wash., D. C., Mar. 2, storm drainage, Sects. 1 and 2, from V. P. Loftis Co., Builders Bldg., Charlotte, **$37,310. FWA.** CD 2/12—ENR 2/18.

†**Tex., Elgin**—City, c/o Sadie McCulloch, secy., Mar. 4, well, reservoir, pump. sta. and cleaning watermains, etc., Docket, Tex. 41-415, from F. R. Rundell, 309 Fannin St., Austin, **$42,440. FWA.** CD 2/12—ENR 2/18.

†**Wash., Kirkland**—C. F. Trent, city clk., Mar. 1, sewers, from C. V. Wilder, 2006 State St., Bellingham, **$27,841. FWA.** CD 2/24.

CONTRACTS AWARDED

†**Florida**—U. S. Eng., U. S. Courthouse & Post Office, Jacksonville, sewer line, Inv. Neg.-Jax.-43-610, Duval Co., to Boyd & Goforth, Inc., 1226 W. Forsyth St., Jacksonville, less than **$50,000.** Awarded 2/22.

†**Florida**—U. S. Eng., U. S. Courthouse & Post Office, Jacksonville, sewage treatment sys., Orange Co., to R. E. Clarson, Inc., Power & Light Bldg., St. Petersburg, under **$100,000.** Awarded 2/12.

†**Kansas**—U. S. Eng., 10 E. 17 St., Kansas City, Mo., sewage disposal plant, water supply sys., Saline Co., to Jack Constr. Co., Security Natl. Bank Bldg., Kansas City. CD 2/12—ENR 2/18.

★†**Michigan**—U. S. Eng., 700 Union Guardian Bldg., Detroit, sanitary sewers, sewage, treatment plant, water supply lines, distr. sys., water reservoirs, pump houses, Jackson Co., to McDermott & Sons, 402 Housemann Bldg., Grand Rapids, less than **$1,000,000.**

†**Nev., Las Vegas**—Federal Works Agency, 1206 S. Santee St., Los Angeles, Calif., sewage treatment plant, Docket Nev. 26-116, to H. F. Hendrickson Co., 2811 Clearwater St., Los Angeles, Calif., **$4,170.** CD 2/23. Awarded 3/2.

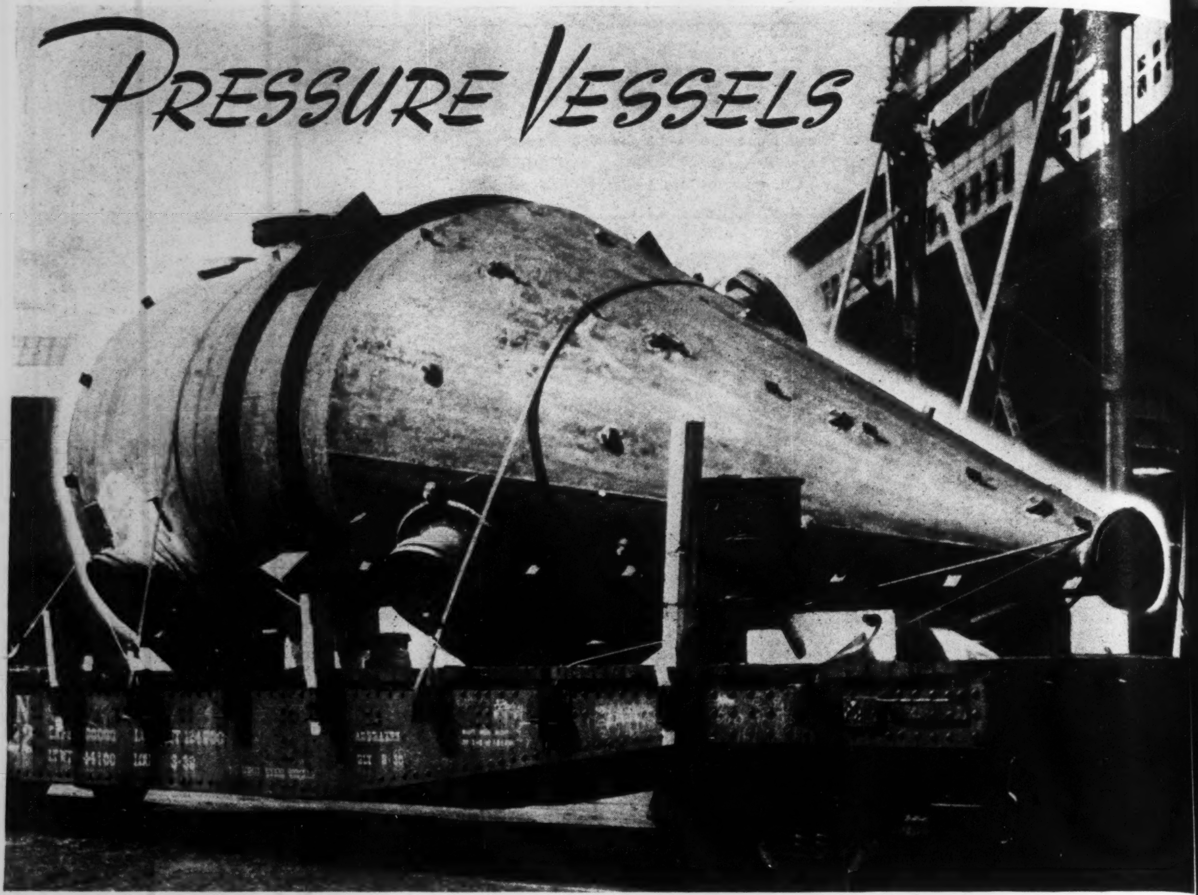
†**North Carolina**—U. S. Eng., 308 Customhouse, Wilmington, constructing, completing sewage collection and water distr. sys., New Hanover Co., to Seckinger Sons Co., 180 Forsyth St. S.W., Atlanta, Ga., under **$50,000.**

†**Pennsylvania**—U. S. Eng., Standard Oil Bldg., Baltimore, Md., conduit and manholes, Berks Co., to Counties Contg. & Constr. Co., Inc., Opal and Cambria Sts., Phila., under **$50,000.**

★†**Tennessee**—U. S. Eng., 494 Spring St. N. W., Atlanta, Ga., sewage treatment plant, Coffee Co., to Atwood Constr. Co. c/o A. R. Abrams, 41 Exchange Pl. S. E., Atlanta, Ga. Est. under **$1,000,000.**

Wis., Appleton—Sulphite Pulp Mfg. Comn. on Waste Disposal, c/o Institute of Paper Chemistry, 1101 E. South River St., rein-con., frame waste disposal plant to Consolidated Water Power & Paper Co., Wisconsin Rapids, Jerry Donohue Eng. Co., 608 N. 8th St., Sheboygan, engrs.

PRESSURE VESSELS



. . . . are members of the specialist corps

Pressure vessels are seldom made up in standard sizes. Ordinarily they are special structures, designed by engineers who are specialists in their fields to perform certain, definite functions. The petroleum engineer cannot use the same vessel in a synthetic rubber or aviation gasoline plant as the steel mill engineer uses in his process, and the aluminum mill engineer needs still a different type. Each must have vessels of the proper dimensions, shape, pressure or vacuum, and connections to meet his particular requirements.

The vessel illustrated above is a typical example. It was fabricated from carbon molybdenum steel and measures 8½ ft. in diam. by 27 ft. long. The cone portion has a special off-set shape and the nozzles for connections are located at specified points. The welded seams were all x-rayed after fabrication and the completed vessel stress-relieved.

When contemplating the installation of pressure vessels, we will appreciate the opportunity of discussing your requirements with you.

We have facilities for fabricating vessels requiring x-raying and stress-relieving at our Birmingham plant and units designed in accordance with API-ASME specifications at our other plants.

CHICAGO BRIDGE & IRON COMPANY

Chicago . . . . 2101 McCormick Bldg.
New York . . . . 3311-165 Broadway Bldg.
Cleveland . . . . 2201 Guildhall Bldg.
Philadelphia . . . . 1623-"1700" Walnut St. Bldg.
Tulsa . . . . 1617 Hunt Bldg.
Birmingham . . . . 1520 North Fiftieth Street
Washington . . . . 330 Bowen Bldg.
Houston . . . . 5609 Clinton Drive
San Francisco . . . . 1020 Rialto Bldg.

Plants in BIRMINGHAM, CHICAGO, and GREENVILLE, PENNA. **In Canada—HORTON STEEL WORKS, LIMITED, FORT ERIE, ONT.**

BRIDGES, GRADE CROSSINGS

OSED WORK

Malvern—H. Jones, city recdr., via- ver Missouri Pacific R. R. tracks, Main

Santa Clara—Constructing Brokaw ass. $282,415. E. C. Schott, city engr.

th Carolina—U. S. Eng., 308 Custom- Wilmington, withdrew bids to have opened Mar. 3, timber bridge overhead g, drainage and surfacing, Richmond

Memphis—Nashville, Chattanooga & uis Ry. Co., R. L. Schmid, ch. engr., way., Nashville, and Belt Line R. R., neral Manager, 81 Madison Bldg., Mem- new overpass replacing existing struc-

ASKED

Bids Asked March 18

braska—State Dpt. Roads & Irrigation, Scott, state engr., Lincoln, deck steel bridge, FAS 123 A, Newcastle-Ponca at 21 plus 54; 1 multiple span 110 ft. steel Project FAS 373, State Rd., Walthill- at Sta. 242 plus 49; one 45 ft. span pony bridge, Project 635-A, State Rd., Merna- la Springs State Park, at Sta. 443 plus

Bids Asked About March 30

Canton—Stark Co., bridge over East 11 St. S.E. $80,000. John A. Shisler, Hall, engr.

Bids Asked

St. Helens—Columbia Co., R. Tarbell, exten. Cedar Creek bridge, 14 gt., on oose-Pittsburgh Rd.

BIDDERS

ryland—State Road Comn., Baltimore, 23, bridges, Contr. BC. 178-766, from Hedin Constr. Co., Chesapeake and ls Ave. S.W., Wash., D. C., **$167,371***** BC. 178-1-766, from Empire Constr. 31 S. Calvert St., Baltimore, **$99,659***** BC. 178-2-766, from Ligon & Ligon, Ridgewood Ave., Baltimore, **$65,970.** CD —ENR 2/18.

TRACTS AWARDED

C., Wash.—Pub. Roads Admin., 1440 mbia Pike, Arlington, Va., trestle at e 6 War Dpt. Bldg. Road Network, to ino Constr. Co., Box 55, Alexandria, Va., 37. Bids 2/5. CD 1/25—ENR 1/28.

ssouri—State Hy. Comn., Jefferson City, ges, Jackson Co., to List & Weatherly tr. Co., Ry. Exch. Bldg., Kansas City, **$115,664.** Bids 2/17, awarded 2/26. CD

exas—U. S. Eng., Fort Sam Houston, er type trestle, Bastrop Co., to J. D. rbrough, St. Anthony Hotel, San Antonio, er **$50,000.**

STREETS AND ROADS

DS ASKED

Bids Asked March 15

New York—Comr. Parks, office Dpt. Parks, Arsenal Bldg., Central Park, 64 St. and 5 Ave., New York, bituminous macadam repaving Bronx Whitestone Parkway, adjacent to Lin- St. bridge, Contr. Q-125-143, Queens Boro; test borings for proposed structures in Great Kills Park, Cont. R-16-143, Richmond Boro.

Bids Asked March 17

Ia., Boone—Bd. Supervs. Boone Co., surfacing roads involving 43,230 cu. yd. gravel, crush screen and haul, 528,620 units haul, 6,849 cu. yd. pit stripping. Over $25,000. P. Saum, co. engr.

Louisiana—State Dpt. Hys., Baton Rouge, grading, surfacing 0.299 mi. entrance to Leesville Housing Project exten., Vernon Parish; grading, sand clay surfacing 0.232 mi. Red Fish Levee Set Back Hy., Avoyelles Parish; 1,150 cu. yd. washed gravel furnished, hauled and spot dumped, S.P. 901-01-30, Pointe Coupee Parish; 3,000 cu. yd. S.P. 901-01-66, Allen Parish; 4,000 cu. yd. washed gravel furnished, hauled and del. S.P. 901-01-65, Evangeline Parish; 4,000 cu. yd. furnished, del. S.P. 901-01-64, Calcasieu Parish. D. Y. Smith, dir.

Bids Asked March 18

†**Nebraska**—State Dpt. Roads & Irrigation, W. G. Scott, state engr., Lincoln, oiled road, grading, sand gravel surfacing, culverts, prime coat armor coat 3 mi. DA WI 3- access road; sand gravel surfacing, concrete paving, culverts 4 mi. AN FA-C, Hasting east; oiled road, 1 bridge, bituminous mat. surface course, prime coat armor coat surfacing 3 mi. SN FA 78, Wahoo-Omaha Rd.; concrete for culverts 113-A, State Rd., Ventner-Niavrar; Proj. 168-B, State Rd., Bassett-Stuart; Project 322-E State Rd., Burwell-Ord; Proj. 351-A, State Rd., Butte south.

Bids Asked March 19

★ **Pennsylvania**—Office J. U. Shroyer, **secy.** Hys., Harrisburg, concrete paving 17,497 ft. Appl. 294, Sect. 2, Appl. 254, Sect. 2, Traffic Route 930, Aliquippa and Monaca Boros, Hopewell and Center Twps., Beaver Co. Over **$1,000,000.** Plans deposit **$2.50.**

Bids Asked March 22

Ia., Sioux City — Bd. Supervs. Woodbury Co., Sioux City, maintenance surfacing 276.54 mi. roads. Over $25,000. J. C. McLean, Sioux City, co. engr.

Bids Asked March 24

California — State Hy. Dpt., Sacramento, grading and plant mix on cement treated surfacing 4 mi. between ½ mi. south of Clear Creek and Redding Subway, Shasta Co. G. T. McCoy, hy. engr.

Bids Asked

★ **Pennsylvania**—State Hy. Dpt., Harrisburg, rejected bids imprv. 17,497 ft. Beaver Co. Over $500,000. Will readvertise. CD 1/26—ENR 1/28 under LB.

†**Texas**—U. S. Eng., 25 St. and Avenue F, Galveston, concrete sidewalks, Solic. 359-43-C50, Harris Co. $25,000. Plans deposit $25.

†**Texas**—U. S. Eng., Dallas, asphalt paving, grading, Dallas Co. Over $25,000.

LOW BIDDERS

Louisiana—State Dpt. Hys., Baton Rouge, Mar. 2, imprv. 1.756 mi. Florida Ave.-Gentilly Rd., State Route C-2043, Orleans Parish, from A. C. Campbell Co., 324 First National Bank Bldg., Shreveport, **$87,934.**

Maryland—State Roads Comn., Baltimore, imprv. 6.429 mi. Contr. S.M. 255-566, St. Mary's Co., from Somerset Constr. Co., 1126 S. Sharp St., Baltimore, **$192,310.** Bids 2/23. CD 2/16—ENR 2/18.

★ **Ohio**—State Hy. Dpt., Columbus, Mar. 3, imprv. 1.308 mi. Cuyahoga Co., from The Kalill Co., 4161 W. 150 St., Cleveland, **$513,794,** est. $566,000***0.208 mi. Ottawa Co., from C. P. Calaway, 1220 Madison Ave., Toledo, **$37,719,** est. $38,600***2.819 mi. Trumbull Co., from The Kelley & Meyer Co., 522 Dallar Bank Bldg., Youngstown, **$30,478,** est. $30,500***4.923 mi. Licking Co., from Ohio Road Improvement Co., 341 Chamber of Commerce Bdg., Coumbus, **$69,817,** est. $84,900***1.521 mi. Lorain Co., from Ohio Engineering Co., 105 6 St., Lorain, **$32,594,** est. $32,600*** 0.332 mi. Portage Co., from Hollinger-Davidson Co., 85 E. Thornton St., Akron, **$28,624,** est. $29,300***4.003 mi. Washington Co., from Muskingum Valley Asphalt & Supply, Inc., 226 Masonic Bldg., Zanesville, **$81,385,** est. $81,400. Received no bids imprv. 0.883 mi. and 1.222 mi. Marion Co.; 1.18 mi. Columbiana Co., $12,900. CD 2/19—ENR 2/25.

★ **Tennessee** — State Hy. Dpt., Nashville, Mar. 5, imprv. 2.044 mi. Sullivan Co., from A. B. Long, Harriman, **$618,164.** CD 3/2—ENR 3/4.

CONTRACTS AWARDED

†**Alabama**—U. S. Eng., U. S. Courthouse & Customhouse, Mobile, asphalt paving, Montgomery Co., to Hodgson Concrete & Asphalt Co., Montgomery, **$50,000-$100,000.**

†**Arizona** — U. S. Eng., P. O. Box 1270, Kingman, street improvements, reception center, Yuma Co., to Brown, Dako & Baun, Pismo Beach, Calif., over **$100,000.**

†**California**—U. S. Eng., 4133 Main St., Riverside, roads, Riverside Co., to Calowell Constr. Co., Hy 99 and Pierce Rd., Bakersfield, over **$100,000.** Awarded 2/27.

†**Florida**—U. S. Eng., U. S. Courthouse & Post Office, Jacksonville, clearing, grubbing, excav., stabilization, limerock base course and bituminous seal coat, Dade Co., to W. T. Price Dredging Corp., 3200 S.W. 27 Ave., Miami, **$100,000-$500.000.**

†**Florida**—U. S. Eng., U. S. Courthouse & Post Office, Jacksonville, roads, Inv. Neg.-Jax.-43-576, Clay Co., to Marion Contracting Co., Ocala, less than **$50,000.** Awarded 2/23.

†**Illinois**—U. S. Eng., 520 Merchandise Mart, Chicago, service drives, sidewalks, site grading, Fulton Co., to Jansen & Schaefer, Pekin, **$100,000-$500,000.**

Kentucky — Dpt. Hys., Frankfort, imprv. 0.916 mi. road Jefferson Co., to Highland Co., Inc., 644 Baxter St., Louisville, **$55,081.** CD 3/2—ENR 3/4 under LB.

†**Maine**—U. S. Eng., Park Square Bldg., Boston, Mass., concrete paving, No. 175-43-NEG 228, to Carlo Bianchi & Co., Inc., 24 Union Ave., Framingham, Mass. Est. **$50,000.**

Maryland—State Roads Comn., Baltimore, imprv. 6.17 mi. St. Mary's Co., to James Julian, S. du Pont Rd., Esmer, Wilmington, Del., **$258,744.** Bids 1/26. CD 1/18—ENR 1/21.

†**Massachusetts**—U. S. Eng., Park Square Bldg., Boston, road construction, No. 175-43-NEG 234, Barnstable Co., to M. F. Roach Co., 55 Spring St., East Bridgewater. Est. under **$50,000.** Bids 2/17.

†**Michigan**—U. S. Eng., 700 Union Guardian Bdg., Detroit, walks, drives, Washtenaw Co., to C. J. Rogers, 14836 Grand River Ave., Detroit, less than **$1,000,000.**

Minn., Red Wing—Goodhue Co., graveling roads, to Backstrom & Midness, Cannon Falls, **$54,269.** Bids 2/18. CD 2/5—ENR 2/11.

†**New Mexico**—U. S. Eng., Albuquerque, palliative treating, De Baca Co., to W. L. Denson, 207 S. Hermosa St., Albuquerque, **$50,000-$100,000.**

★ †**New York**—U. S. Eng., 120 Wall St., New York, paving, Westchester Co., to Wm. P. McDonald Corp. and Good Roads Eng. & Contr. Co. Inc., 33-15 Lawrence St., Flushing, **$500,000-$1,000,000.**

†**Oklahoma**—U. S. Eng., 416 Wright Bldg., Tulsa, asphalt paving and drives, Muskogee Co., to Plains Constr. Co., Pampa, **$50,000-$100,000.**

†**Ore., Eugene** — Williamette Natl. Forest Service, Eugene, 12 one-half mi. road, incl. bridge, own forces. **$70,000.**

LEADITE

The Pioneer Self-Caulking Material for C. I. Pipe

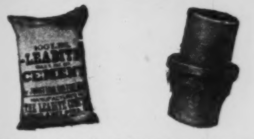


TABLE OF COMPARATIVE QUANTITIES

Nominal inside dia. of pipe, in.	Depth of joint, inches of Leadite	Approx. lbs. of Leadite per joint	Depth of joint, inches of lead	Approx. lbs. of lead per joint
4	2.5	2.00	2.25	8.56
6	2.5	3.00	2.25	11.71
8	2.5	4.00	2.25	14.63
10	2.5	5.00	2.25	17.70
12	2.5	6.00	2.25	20.86
14	2.5	7.00	2.25	24.02
16	2.5	8.25	2.25	33.07
18	2.5	9.25	2.25	36.88
20	2.5	10.50	2.25	40.71
24	2.5	13.00	2.50	53.02
30	2.75	16.00	2.50	65.36
36	2.75	19.00	2.50	77.96
48	3.50	30.00	3.00	121.15
54	4.0	38.00	3.00	135.60
60	4.0	42.00	3.00	150.70

THE LEADITE COMPANY
Girard Trust Co. Bldg., Philadelphia, Pa.

No Caulking

MORETRENCH
WELLPOINT
SYSTEMS

FOR DRY SUBGRADES
AT LOW COST
ON ANY WET JOB
★
FOR WATER SUPPLY
★
QUICK DELIVERY OUT
OF STOCK

Rental — Sales — Contracts

MORETRENCH
CORPORATION
90 West St., New York, N. Y.
Rockaway, N. J., Chicago, Ill.,
New Orleans, La.

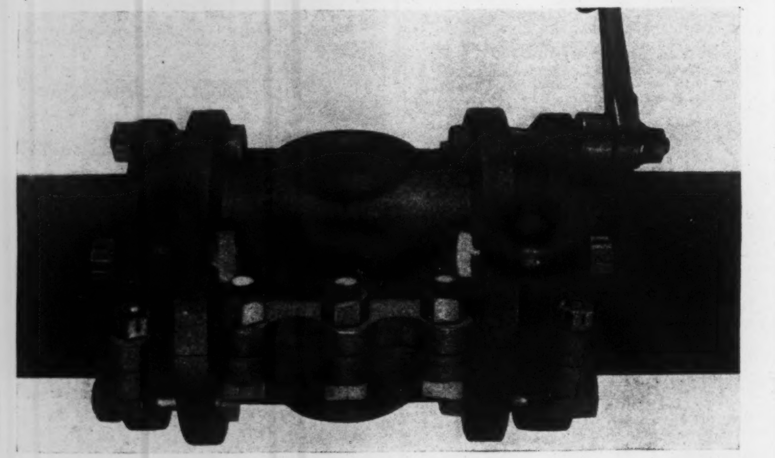
FOUNDATIONS

PRETEST UNDERPINNING
CONCRETE-STEEL PILES
MASS CONCRETE CONSTRUCTION
HEAVY SHORING
DRILLED-IN CAISSONS

DRILLED-IN CAISSONS
FOUNDATIONS

Send for catalogs descriptive of the latest foundation types and methods.

SPENCER, WHITE & PRENTIS, INC.
10 EAST 40th ST. NEW YORK, N. Y.



QUICK—ECONOMICAL—EFFECTIVE

repairs of broken pipe can be made with Doublex Simplex Split Sleeves. Attractively priced. All sizes—2 inches through 36 inches. Makes a good tapping sleeve, too.

"Peevish Pete"
the Pipe Peddler Says:
"I can't get around as often as I'd like to, but am still making special efforts to meet special problems and can make some trips. Send me a postcard."

AMERICAN
CAST IRON PIPE
COMPANY
BIRMINGHAM, ALABAMA
Dallas • Houston • El Paso • Pittsburgh
Kansas City • Chicago • Minneapolis
New York City • Cleveland • Los Angeles
San Francisco

STREETS AND ROADS (Contracts Awa Cont'd.)

†Texas—U. S. Eng., Fort Sam Ho addnl. road construction, Bexar Co. Rodgers & Stewart, 1407 W. Laurel St., Antonio, under **$50,000.**

†Texas—U. S. Eng., 25 St. and Avenue Galveston, asphalt paving, Cameron Co. H. H. Hedges & Sons, 1909 Runnels Houston, **$50,000-$100,000.**

†Texas—U. S. Eng., Fort Sam Hous addnl. concrete sidewalks, asphalt pav Bastrop Co., to G. Mora, 12 Sabine Houston, under **$50,000.**

†Texas—U. S. Eng., Fort Sam Hous addnl. concrete and asphalt paving, Bell to Holland Page, Georgetown Rd., Aus under **$50,000.**

Texas—State Hy. Comn., Austin, imp 9.424 mi. Coryell Co., from Cage Bros.-Pa & Winters, Bishop, **$115,792**; est. $12 3.254 mi. Smith Co., from Ben Sira & 3901 Elm St., Dallas, **$53,800**, est. $5 CD 2/3—ENR 2/11.

Utah—State Road Comm., J. S. Eva chn., Salt Lake City, 2½ in. road mix b minous surfacing 0.725 mi.; also steel gi bridge, Tooele Co., to F. S. Whiting, St., Salt Lake City, **$62,058.** Est. $73 Bids 2/26.

★ **Newfoundland**—Dpt. Munitions & Sup Ottawa, Ont., roads, to Atlas Constr. Ltd., 679 Belmont St., Montreal, about **000,000.**

EARTHWORK WATERWAYS

PROPOSED WORK

Md., Cumberland—Bids soon dredging W Creek, clearing Smith's Island. $15,000. R. Rizer, city engr.

★ **†Texas**—U. S. Eng., 231 W. Main St., De son, completion, addnl. new work Denison Red River Power Dam, Grayson $14,000,000.

Tex., Edinburg—Hidalgo County Nurse Project, Edinburg, irrigation sys., 15,000 li ft. underground and 70,000 lin. ft. overhe pipe, 70,000 lin. ft. wind fence, sprinklers automatic pump. units, etc. Over $15,000.

Wisconsin—Portage Levee Comm., Portag imprv. levees along Wisconsin River, Columb and Sauk Counties. $50,000.

Man., Brandon—Ducks Unlimited, Brando development Douglas Flats so that 2 fe water will cover area, imprvs. at Dougla Dam. Engineer c/o R. M. Hopper, Brando

BIDS ASKED

Bids Asked March 22

†Mississippi—U. S. Eng., U. S. Post Office Courthouse, Vicksburg, 160,000 cu. yd. earth work and drainage work on west bank Cold water River, Tunica Co.

LOW BIDDERS

La., Erath—T. E. Golden, c/o Bank Erath, 400,000 cu. yd. drainage work, fro J. Ray McDermott & Co., Inc., Harve **$47,000.**

CONTRACTS AWARDED

†Texas—U. S. Eng., Fort Sam Housto grubbing, dirt work, clearing, Coryell Co., R. P. Farnsworth Co., 1515 S. Salcedo St New Orleans, La., under **$50,000.**

Wis., Appleton—Wisconsin-Michigan Powe Co., Appleton, remodeling water wheel pl rein.-con. construction, to C. R. Meyer & Sons Co., 50 State St., Oshkosh. Est. **$20,000.** Mead Ward & Hunt Co., 550 State St., Madison engrs.

B. C., Steveston—Dpt. P. Wks., Ottawa, Ont., jetty repairs, to Gilbey Bros. Ltd. 902 Columbia St., New Westminster, **$31,8** Bids 12/30.

UNCLASSIFIED

PROPOSED WORK

★ **California**—RAILROAD IMPROVEMENTS—Atchison, Topeka & Santa Fe Ry. Co. G. W. Harris, ch. engr., 80 E. Jackson Blvd. Chicago, Ill., general imprvs. southern California, incl. double tracking 30% line between San Diego and Los Angeles. $3,000,000.

Colo., Colorado Springs—IMPROVEMENTS—City, $100,000 bond election April 6, imprvs

★ **†Kan., Kansas City**—IMPROVEMENTS—A. McDonald, city mgr., imprvs., grading etc. $2,227,000. CAA gr. approved.

★ **†Kan., Kansas City**—IMPROVEMENTS—City imprvs., grading, etc., $2,227,000 CAA gr. A. McDonald, city mgr.

Kentucky—DOCKS, etc.—Kosmos Portland Cement Co., Starks Bldg., Louisville, unloading docks, tank storage facilities, etc., incl. pipeline and pump. station, Ohio River, near World's Creek, southwest of Louisville. Over $25,000.

La., Baton Rouge—IMPROVEMENTS—East Baton Rouge Police Jury, F. Benton, atty. Baton Rouge, plans by A. Hays Town, Louisiana National Bank Bldg., imprvs., bldg.

Me., Rockland—WHARF—E. R. Veazie mayor, preliminary survey wharfage facilities addn. $25,000 or more.

Mass., Ware—ATHLETIC FIELD—Town, c/o L. Greenfield, chn. Comm., plans by Chas.

LASSIFIED (Proposed Work, Cont'd.)

ingman, 7 Grove St., Palmer, athletic incl. grading, drainage, bldg., structures.

Columbia—IMPROVEMENTS—City, c/o W. Stickney, airport mgr., Columbia, s. D. Welch, city engr. E. W. Wiggins ys, Inc., will finance. CD 5/5—ENR 5/7.

braska—CONSTRUCTION—U. S. Eng., Jackson St., Omaha, engineer-architect es and supervision construction, Buffalo by L. F. Harza, 205 W. Wacker Dr., go, Ill.

Jersey—IMPROVEMENTS—East Coast ards, Inc., foot of 21 St., Bayonne, re- tation imprvs.

x., **Anahuac**—OIL WELL—G. H. McCar- Anahuac, drilling, developing oil well. 00.

x., **Archer City** — OIL WELLS — T. B. ers, Wichita Falls, drilling, developing more deep test oil wells. $25,000.

x., **Beaumont**—OIL WELL—G. McCarthy Phillips Petroleum Co., Beaumont, drill- developing, casing oil well. $25,000.

x., **Calvert**—OIL WELL—Magnolia Petro- Co., Magnolia Bldg., Dallas, drilling, g, developing 8,000 ft. oil well. $25,000.

x., **Cash** — OIL WELL — Hollandsworth ing Co., Longview, drilling, developing deep test oil well. $25,000.

x., **Colorado City**—OIL WELL—Sun Oil Big Springs, drilling, developing, casing ell. $25,000.

., **Elkhart** — OIL WELL — Byrd-Frost, Palestine, drilling, casing, developing test oil well. $25,000.

x., **Houston**—TRACT IMPROVEMENTS E. Deats & D. L. Anderson, Union Na- l Bldg., imprv. 972 acre tract, fencing, hen tank, feeding and stock housing s, etc. Over $25,000.

x., **Marshall**—OIL WELLS—D. E. Whelan ssociates, Marshall, drilling, developing wells. Over $25,000.

x., **Palestine**—OIL WELL—Texas Co., 720 Jacinto St., Houston, drilling, casing, de- ping new deep test oil well. $25,000.

x., **Realitos**—OIL WELLS—Stanolind Oil as Co., Corpus Christi, drilling, develop- 1 or more deep test oil wells. $25,000.

x., **Three Rivers**—OIL WELL—Sal Vieja Co., Corpus Christi, drilling, developing, ng 3,095 ft. oil well. $25,000.

S ASKED

Bids Asked on or About March 16

O., **Columbus** — IMPROVEMENTS — U. S. ., 522 U. S. Post Office & Court House, innati, imprvs.

Bids Asked March 18

ew York—PLANTING, etc.—Comr. Parks Office Dpt. Parks, Arsenal Bldg., Central k, 64 St. and 5 Ave., New York, planting topsoiling incidental to paving south ice road of Grand Central Parkway from St. to Ditmars Blvd. and Ditmars Blvd. m 91 to 93 Sts., also intersection of Boody and Connecting hy. with Grand Central kway, Queens Boro, Contr. Q-84A-241.

Bids Asked March 24

Y., New York—TRACK SPECIAL WORK d. Transportation, 250 Hudson St., New k, track special work, frogs and switch nts. Bid 20478.

Bids Asked

★ †**Kansas**—IMPROVEMENTS—U. S. Eng., 10 E. 17 St., Kansas City, Mo., imprvs., g., Shawnee Co. $600,000. Battey & lds, 231 S. La Salle St., Chicago, Ill., ht.

ichigan—RAILROADS, etc.—Chicago & th Western Ry., B. R. Kulp, ch. engr., 400 Madison St., Chicago, Ill., new railroads, rv. present roads, strengthening bridges, . in mining territory in Upper Peninsula.

W BIDDERS

†**Arizona**—IMPROVEMENTS—U. S. Eng., S. Figueroa St., Los Angeles, Calif., prvs., No. 1145, Pinal Co., from Arizona nd & Rock Co., S. 7 St. and River Bank, oenix, over **$100,000.** Bids 3/1.

†**California**—UTILITIES—U. S. Eng., 1209 St., Sacramento, Mar. 2, utilities, paving, ec. 423, Sacramento Co., from A. Teichert Son, Inc., Box 1113, Sacramento, under **,000.**

†**California** — UTILITIES — U. S. Eng., ight Bldg., Sacramento, utilities, Spec. 462, n Joaquin Co., from A. Teichert & Son, c., P. O. Box 113. Est. under **$50,000.**

ew York—CONSTRUCTION—Comr. Parks, t, Parks, Arsenal Bldg., Central Park, 64 and 5 Ave., New York, Mar. 4, completing unfinished WPA projects in Manhattan, onx, Brooklyn and Queens, Contr. M-10-143, om Frank Wascall & Sons, Inc., 4634 3 e., New York, **$182,483.** CD 2/11—ENR 18.

†**Texas, College Station**—IMPROVEMENTS —Civil Aeronautics Admin., P. O. Box 689, ar. 5, imprvs., from Austin Road Co., 1813 arence St., Dallas, Schedule 1, **$102,340,** hedule 2-B, **$380,856.** CD 3/1—ENR 10/15.

NTRACTS AWARDED

†**Alabama**—FACILITIES, etc.—U. S. Eng., 4 Spring St. N.W., Atlanta, Ga., constructing,

Faster Fueling
FOR TRUCKS, PLANES, AND INDUSTRY
DEMING
DEMING
DEEP WELL TURBINE PUMPS FOR GASOLINE AND FUEL OIL
DEMING PUMPS
FOR WAR INDUSTRIES

the Deming Gasoline and Fuel Oil Pump

Successful performance in rapid, dependable refueling of war planes and commercial planes is the forerunner of a wide demand for *Deming Gasoline and Fuel Oil Pumps* in other applications.

For example, these pumps offer important advantages in fueling stations for trucks, tanks and marine craft; for pumping operations in refineries; and for pumping quenching oil and other liquids in general industrial service.

Since the turbine assembly is always submerged, the liquid pumped is actually pushed through the system in a steady, continuous flow.

Deming Gasoline and Fuel Oil Turbine Pumps are shipped completely assembled and are exceptionally simple to install and maintain. Capacities range from 50 to 1000 GPM.

A loose-leaf binder containing factual information and engineering data about these and other types of Deming Industrial Pumps is available upon request. Write for your portfolio NOW while the supply is quickly available.

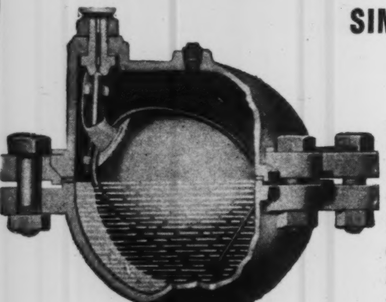
THE DEMING CO. • SALEM, OHIO

UNDERPINNING &
FOUNDATION CO., Inc
Engineers & Contractors
155 E 44 St., NEW YORK

IS AIR SABOTAGING YOUR PIPE LINES AND PUMPS?

If not removed, air entrained in a liquid or entering the system through leaky joints and pump suctions, may result in serious damage to the pipe line and to the pumping equipment. These air obstructions not only reduce the operating head, but the area of discharge is considerably reduced or entirely cut off.

SIMPLEX AIR RELEASE VALVES AUTOMATICALLY VENT AIR ACCUMULATIONS



THE Simplex Automatic Air Release Valve is of simple, dependable construction, having but one lever movement which operates a needle valve so designed as to be always tight seating. The valve is operated by a heavy thickness glass ball float, tested to several times the service working pressure. A cast iron shell houses the actuating parts which are of corrosion resisting materials.

Standard Simplex Air Release Valve is for working pressures up to 250 lbs. per square inch. The Type "ARA" valve is similar in design but operates up to 1250 lbs. per square inch. Simplex Air Release Valves are being used extensively on lines and pumps for the release of air in water and sewage lines, oil and gasoline lines, and for industrial process liquids.

Write today for further information on the Simplex Air Release Valve — the automatic watchdog to assure continuous peak flow.

SIMPLEX VALVE & METER COMPANY
6751 Upland Street • Philadelphia, Pennsylvania

UNCLASSIFIED (Contracts Awarded, Con completing addnl. facilities, incl. connect to outside utilities, Calhoun Co., to Marb Boriss Constr. Co., Massey Bldg., Birmingha **$50,000-$100,000.**

†Alabama—AUTOMATIC SPRINKLER SY TEM, etc.—U. S. Eng., 494 Spring St., Atlan Ga., automatic sprinkler sys., walkwa Etowah Co., to Grinnell Co., Inc., Highla St. S.W., Atlanta, Ga. Est. **$40,000.**

†Arizona—GASOLINE FUELING SYSTEM U. S. Eng., 401 W. Adams St., Phoenix, A gasoline fueling sys., No. 1040, Maricopa C to Wonderly Constr. Co., 2964 Line Ave., Lo Beach, Calif., under **$100,000.** Awarded 1

California—DOCK—Henry J. Kaiser C Latham Square Bldg., Oakland, widen concrete fitting out dock, to Cahill Bros., Sansome St., San Francisco. **$92,810.** L Nishkian, 155 Sansome St., San Franci engr.

†California—IMPROVEMENTS—U. S. Eng 4133 Main St., Riverside, imprvs., housin Orange Co., to W. J. Hunter, 660 Heliotro Dr., Los Angeles, over **$100,000.**

†California—IMPROVEMENTS—U. S. Eng 1209 8 St., Sacramento, imprvs., bldgs., Spe 429, Sacramento Co., to Lawrence Cons Co., 3511 E. Curtis Park Dr., Sacramen Est. under **$100,000.** Bids 2/23. CD 2/15.

★**†Calif., Alameda** — IMPROVEMENTS — Yards & Docks, Navy Dpt., 18 St. an Constitution Ave. N. W., Wash., D. C., imprv NOY 5935, to Dinwiddie Const. Co., 210 Crock Bldg., San Francisco, **$548,500.** Awarded 1

†Colorado—ELECTRIC CONTROL SYSTE —U. S. Eng., c/o Postmaster, Denver electrical control sys., Denver Co., to Long & Jess Wilda Bldg., Denver. Est. under **$50,000.**

†Florida—GASOLINE STORAGE SYSTEM—U. S. Eng., U. S. Courthouse & Post Office, Jacksonville, a.c. gasoline storage sys., Inv Neg.-Jax.-43,605, Polk Co., to Aqua Systems Inc., 385 Gerard Ave., New York, N. Y., les than **$50,000.** Awarded 2/23.

†Florida — CONSTRUCTION — U. S. Eng., U. S. Courthouse & Post Office, Jacksonville, construction, Inv. Neg-Jax-43-607, Duval Co., to J. R. Hume Electric Co., 376 S. County Rd., Palm Beach, under **$50,000.** Awarded 2/22.

†Florida—RECONSTRUCTION—U. S. Eng. U. S. Courthouse & Post Office, Jacksonville dismantling, reconstructing and re-erecting equip., Inv. Jax-43-603, Duval Co., to Bethlehem Steel Co., Bethlehem, Pa., under **$500,000.** Awarded 2/20.

†Florida—ELECTRIC DISTRIBUTION SYSTEM—U. S. Eng., U. S. Courthouse & Post Office, Jacksonville, electric distr. sys., Inv. NEG-JAX-43-616, Dade Co., to Ingalls Electric Co., 961 S.W. 2 St., Miami, under **$50,000.** Awarded 2/22.

†Florida—GASOLINE STORAGE SYSTEM —U. S. Eng., U. S. Courthouse & Post Office, Jacksonville, a.c. gasoline storage sys., Inv. Neg-Jax-43-606, Highlands Co., to Murphy Constr. Co., Clare Ave., West Palm Beach, under **$50,000.** Awarded 2/20.

†Florida — IMPROVEMENTS — U. S. Eng., U. S. Courthouse & Post Office, Jacksonville, imprvs., Inv. NEG-M.D.-43-20, Hillsborough Co., to Cone Bros. Contg. Co., Caesar St. and Cumberland Rd., Tampa, under **$100,000.** Awarded 2/23.

†Georgia—FACILITIES—U. S. Eng., Post Office Bldg., Ware Co., to Christian & Bell Co., 101 Marietta St. N.W., Atlanta, Ga. **$50,000-$100,000.**

†Illinois—HEATING, etc.—U. S. Eng., 529 Merchandise Mart, Chicago, heating, ventilating and process piping, Cook Co., to Robert Gordon, Inc., 19 N. Jefferson St., Chicago. **$50,000-$100,000;** paint precipitation sys. for paint shop, to Binks Mfg. Co., 3124 W Carol St., Chicago, under **$50,000.**

†Ill., Chicago—IMPROVEMENTS—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., imprvs. and altering present naval training school, 87 St. and Anthony Ave., NOY 5936, to Henry Ericsson Co., 228 N. La Salle St., **$293,020.**

★**†Ia., Cedar Rapids**—IMPROVEMENTS—City, imprvs., to Hallett Constr. Co., Crosby, Minn. and Megarry Bros., 437-33 Ave. N., St. Cloud, Minn., **$975,429.** CAA. CD 2/24—ENR 3/4 under LB.

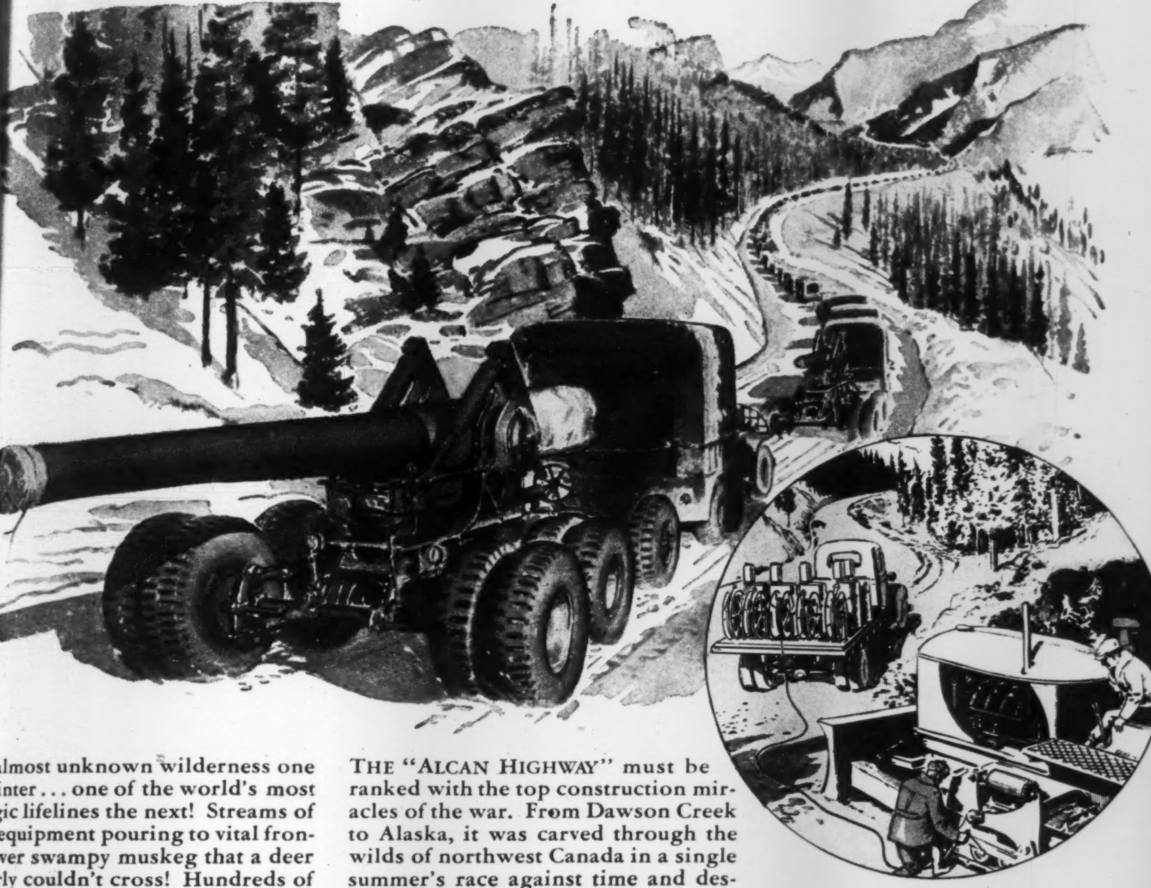
†Kansas—IMPROVEMENTS—U. S. Eng., 10 E. 17 St., Kansas City, Mo., imprvs. addnl. bldgs., to Patti-McDonald Const. Co., 1114 Bway., Kansas City, Mo. Est. **$125,000.** Former contract rescinded. CD 3/1—ENR 3/4 under CA; water distr. sys., to Frankamp-Parker Co., Omaha, Neb.

★**†Kansas**—IMPROVEMENTS—U. S. Eng., 10 E. 17 St., Kansas City, Mo., imprvs. bldgs., Ellis Co., to Jones-Hettelsater Constr. Co., Mutual Bldg., Kansas City, Mo. Est. **$1,000,000.** Bids 2/24. CD 2/19.

†Kansas—IMPROVEMENTS—U. S. Eng., 10 E. 17 St., Kansas City, Mo., imprvs., water distr. and sewerage sys., to Burt & Benford, Hutchinson, est. **$70,000;** paving to Hallett Const. Co. and Nelson, Mullen & Webster, Inc., 355 Gateway Bldg., Minneapolis, Minn.; foregoing in Ellis Co.

★**†Louisiana** — IMPROVEMENTS — U. S. Eng., 25 St. and Avenue F, Galveston, Tex., imrvs., bldg., East Baton Rouge Parish, to Perrilliat-Rickey Const. Co. and Barber Bros. Co., Raymond Bldg., Baton Rouge. Est. under **$1,000,000.**

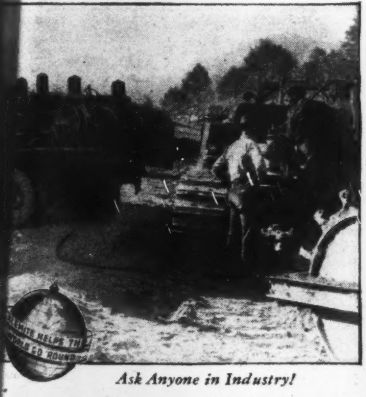
The BIG GUNS ARE MOVING on "the Lifeline that *Couldn't Be Built*". . .



AN almost unknown wilderness one winter . . . one of the world's most strategic lifelines the next! Streams of heavy equipment pouring to vital fronters over swampy muskeg that a deer formerly couldn't cross! Hundreds of miles of rock and dust and grit and water—tamed in months instead of the years it would normally take!

THE "ALCAN HIGHWAY" must be ranked with the top construction miracles of the war. From Dawson Creek to Alaska, it was carved through the wilds of northwest Canada in a single summer's race against time and destiny—to shorten our supply route to Alaska from weeks to days. Heavy machinery, flown to airports hand-hewn in the wilderness, thundered where only animal noises had been heard before. And before the last leaves fell, the "lifeline that couldn't be built" shook under the treads of guns and tanks on their way to our farthest-north frontier.

AS USUAL, where the going is tough and machine breakdowns must be avoided, Alemite went along to help build the "Alcan Highway". On bull-dozers, graders, tractors that had to work three shifts a day *or else*—Alemite Lubrication Systems stood guard against wear. And Alemite Portable Service Stations developed for this job fed those Alemite Systems the special lubricants each part required.



Ask Anyone in Industry!

ALEMITE

REG. U.S. PAT. OFF.

Industrial LUBRICATION

1821 Diversey Parkway, Chicago, Ill. • Belleville, Ontario

ON COUNTLESS construction jobs, large and small, Alemite Portable Service Stations on *the job have paid for themselves in days*—in time saved on lubrication of equipment. Less "time out" for lubrication means more time for moving dirt each day—more yards moved every day at a definite per-day cost.

What's equally important, the Alemite Portable Service Station *on the job* means that every machine is getting the kind of protection the manufacturer intended. Protection against friction—against dust penetration and undue wear—means longer life for every machine!

Write today for your FREE copy of the new Catalog of "Alemite Portable Service Stations", showing various set-ups available, and the many ways in which they can speed operations for you. This book is just off the press. It's crowded with photographs and facts. Send for your copy NOW!

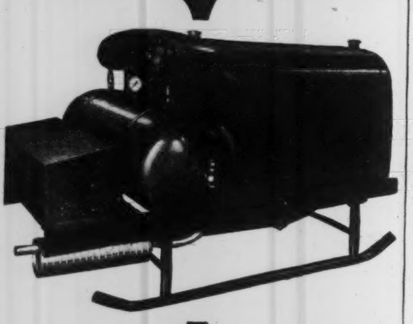
Another Product of
STEWART WARNER

Power

and plenty of it!

With the new, Victory Model 60 cu. ft.

SMITH AIR COMPRESSOR



uses only 1 gallon of gasoline an hour

SAVE 3-WAYS

SAVE TIME: The Smith is lightweight, flexible, — easy to move from one job to another. SAVE MONEY: — on original purchase price — on operating costs. SAVE GASOLINE — more important than ever before.

60 cu. ft. size (illustrated above) uses less critical material than any other standard compressor. Made with FORD MOTORS and standard parts. Repairs and parts available at any Ford garage. Automatic unloading and idling; self-starter. Wire, phone or write TODAY for complete information.

With a Ford Motor and shop facilities you can assemble your own Smith Compressor. We will furnish a Smith Compressor Head and Accessories with complete instructions for mounting.

Write for free Booklet

GORDON SMITH & CO.
INCORPORATED
430 College St., Bowling Green, Ky.

UNCLASSIFIED (Contracts Awarded, Cont'd.)

†Mass., South Boston (sta. Boston) — BRIDGE CRANES — Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., 210 ton bridge cranes, NOY 5957, to Shaw-Box Crane & Hoist Div. Manning, Maxwell & Moore, Inc., Muskegon, Mich., **$27,008.** Awarded 2/17.

†Montana—LIGHTING SYSTEM, etc.—U. S. Eng., 800 3 Ave., Seattle, Wash., street lighting and electrical distr. sys., Cascade Co., to Rowe Electric Co., 12-5 St. S., Great Falls, under **$100,000.**

★**†Nebraska**—IMPROVEMENTS—U. S. Eng., 1709 Jackson St., Omaha, addns. extens. imprvs., Hall Co., to Sioux Syndicate, 261 Aquila Court, Omaha. Est. approx. **$2,000,000.** CD 3/2—ENR 3/4.

★**†Nebraska**—IMPROVEMENTS—U. S. Eng., 1709 Jackson St., Omaha, exten. imprvs. Fillmore Co., to Olson-Assenmacher-Rokahr, Box 1273, Lincoln, Est. approx. **$2,000,000.**

★**†Nebraska**—IMPROVEMENTS—U. S. Eng., 1709 Jackson St., Omaha, extens., imprvs., Thayer Co., to Lancaster Corp., Standard Oil Bldg., Omaha, est. approx. **$2,000,000.**

★**†Nebraska**—IMPROVEMENTS—U. S. Eng., 10 E. 17 St., Kansas City, Mo., imprvs., Red-willow Co., to Patti & McDonald, 1114 Bway., Kansas City, Mo. Est. approx. **$2,000,000.** CD 3/2—ENR 3/4.

★**†Nebraska**—IMPROVEMENTS—U. S. Eng., 1709 Jackson St., Omaha, extens., imprvs., Clay Co., to Olson-Assenmacher-Rokahr, Box 1273, Lincoln. Est. approx. **$2,000,000.**

★**†Nebraska**—IMPROVEMENTS—U. S. Eng., 1709 Jackson St., Omaha, extens., imprvs., Buffalo Co., to Peter Kiewit Sons Co., 1024 Omaha Natl. Bank Bldg., Omaha. Est. approx. **$2,000,000.**

†New Jersey — IMPROVEMENTS — U. S. Eng., 120 Wall St., New York, N. Y., imprvs., lighting sys., Essex Co., to Standard Electric Constr. Co., 566 Bway., Bayonne. Est. **$50,000.**

†N. J., Atlantic City—IMPROVEMENTS—Civil Aeronautics Admin., La Guardia Field, Jackson Heights, N. Y., imprvs., lighting sys., to Edward Zwicker Corp., 415 Lexington Ave., New York, N. Y. Bids 1/25. CD 1/21.

★**†N. J., Bayonne**—FACILITIES—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., addnl. facilities, S.A. 1, NOY 4664, to Geo. H. Flinn Corp., 551 5 Ave., New York, N. Y. and Great Lakes Dredge & Dock Co., 122 S. Michigan Ave., Chicago, Ill., **$4,976,900.**

†New Mexico—CONSTRUCTION—U. S. Eng., Albuquerque, addnl. temporary construction, Luna Co., to K. L. House Constr. Co., Albuquerque, **$50,000-$100,000.**

†New Mexico — IMPROVEMENTS — U. S. Eng., Albuquerque, imprvs., dust palliative treating roads, Luna Co., to A. O. Peabody, Santa Fe, under **$50,000.** CD 2/11—ENR 2/18.

★**†New Mexico** — IMPROVEMENTS — U. S. Eng., Albuquerque, imprvs., oil treating, Otero Co., to Skousen Bros., Albuquerque, less than **$500,000;** housing, technical facilities, Otero Co., to Ponsford Bros., 914 E. Missouri St., El Paso, Tex., under **$500,000.** Awarded 3/2.

†New York—STEAM HEATING SYSTEM—U S. Eng., 960 Ellicott Square Bldg., Buffalo, steam heating sys., Erie Co., to J. Davis, Buffalo, under **$50,000.**

†North Carolina—IMPROVEMENTS—U. S. Eng., 308 Customhouse, Wilmington, imprvs., Cumberland Co., to F. D. Cline, Fairview Rd., Raleigh, under **$50,000.** Bids 2/26.

†Oklahoma—IMPROVEMENTS—U. S. Eng., 231 W. Main St., Denison, Tex., imprvs., Comanche Co., to A. C. Shelton & Son, Lawton, **$50,000-$100,000.**

†Oklahoma—IMPROVEMENTS—U. S. Eng., 231 W. Main St., Denison, Tex., imprvs., asphalt paving, Tillman Co., to Bell & Braden, Amarillo, Tex., under **$500,000.** CD 2/11—ENR 2/18.

†Pennsylvania—GASOLINE FUELING SYSTEM—U. S. Eng., Standard Oil Bldg., Baltimore, Md., gasoline fueling sys., Berks Co., to Aqua Systems, Inc., 385 Gerard Ave., New York, N. Y., under **$50,000.**

†Tennessee—IMPROVEMENTS—U. S. Eng., P. O. Box 97, Memphis, addnl. imprvs. Shelby Co., to Royce Kershaw & Co., Bell Bldg., Montgomery, Ala. Est. under **$100,000. (Correction**—contractor's name.) CD 2/3—ENR 2/11 under CA.

†Texas — AUTOMATIC SPRINKLER SYSTEM—U. S. Eng., 231 W. Main St., Denison, automatic sprinkler sys., Collin Co., to Automatic Sprinkler Corp. of America, 3923 McKinney St., Houston, under **$50,000.**

†Texas—BOUNDARY FENCE—U. S. Eng., 25 St. and Avenue F, Galveston, boundary fence, Limestone Co., to Southwestern Fence Co., 5240 Washington St., Houston, under **$50,000.**

†Texas — ELECTRICAL DISTRIBUTION SYSTEM—U. S. Eng., Fort Sam Houston, outside electrical distr. sys., Kinney Co., to Universal Electrical Co. of Alabama, Inc., 2421 Driscoll St., Houston, under **$50,000.**

†Texas — FIRE ALARM SYSTEM — U. S. Eng., Fort Sam Houston, automatic fire alarm sys., to Graham & Collins and Central Station Signals, Inc., 700 Avenue A, San Antonio, under **$50,000.**

FOUNDATIONS

BUTTON BOTTOM
COMPOSITE—STEEL PILES
COMPRESSED CONCRETE
CAISSON PILES

DRILLED-IN CAISSONS

Engineers available for consultation on any foundation problem. Catalogues on request.

WESTERN

WESTERN FOUNDATION CO.
WESTERN CONCRETE PILE CORP.
308 W. Washington St. Chicago, Ill.
52 Vanderbilt Ave. New York, N. Y.

ASSIFIED (Contracts Awarded, Cont'd.)

xas—FUELING SYSTEM—U. S. Eng., and Avenue F, Galveston, fueling sys., 359-43-C21, Cameron Co., to Mitchell P. O. Box 498, Victoria, **$50,000-$100,000.** 19—ENR 2/25 under LB.

xas — IMPROVEMENTS — U. S. Eng., Sam Houston, imprvs., to R. W. Briggs B. Killian, Sunset Rd., San Antonio, 0-$500,000; imprvs., addnl. temporary uction, to E. W. Oeffinger, 710 Avenue n Antonio, over **$100,000;** both Bexar

as—IMPROVEMENTS—U. S. Eng., 231 ain St., Denison, imprvs., Hunt Co., to wman Co., M. & M. Bldg., Houston, **$50,000.**

as—RAILWAY SIDINGS—U. S. Eng., Sam Houston, addnl. railway sidings, Coryell Co., to Martin & Grace, Rio e Natl. Life Bldg., Dallas, under **$50,000.**

xas—SPRINKLER SYSTEM—U. S. Eng., Sam Houston, automatic sprinkler sys., Co., to Fire Protection Co., Laredo, **$50,000.**

xas—AIR CONDITIONING—U. S. Eng., Main St., Denison, air conditioning for Grayson Co., to Dallas Air Conditioning Inc., 3500 Commerce St., Dallas, under 0.

xas — ELECTRICAL DISTRIBUTION EM, etc.—U. S. Eng., Fort Sam Hous- electrical distr. sys. and signals, Bell to Central Station Signals, Inc., and m & Collins, 700 Avenue A, San An- under **$50,000.**

exas—FIRE WALL—U. S. Eng., 231 W. St., Denison, fire wall, Dallas Co., to O'Rourke, 2019½ Jackson St., Dallas, **$50,000.**

exas—IMPROVEMENTS—U. S. Eng., Fort Houston, imprvs., Bastrop Co., to J. D. rough, St. Anthony Hotel, San Antonio, **$50,000.**

exas — IMPROVEMENTS — U. S. Eng., Sam Houston, imprvs., Bexar Co., to . Briggs & M. B. Killian, Sunset Rd., Antonio, over **$100,000.**

exas—IMPROVEMENTS—U. S. Eng., 25 nd Avenue F, Galveston, imprvs., load- platforms, bldgs., exten. underground ies, etc., Howard Co., to Jim Handley, 720 Travis Bldg., San Antonio, **$50,000- 000.** Bids 2/25.

exas—PARKS—U S. Eng., Fort Sam ton, rein.-con. parks, Bastrop Co., to E. McKee, 1918 Texas St., El Paso, under 00.

x., **Victoria**—OIL WELL—A. C. Vernor, m Bldg., San Antonio, drilling, develop- 5,200 ft. oil well, to Howell Bros., San o, approx. **$25,000.** CD 2/25—ENR 3/4.

Washington — ENCLOSING STAIRWAY, —U. S. Eng., 800 3 Ave., Seattle, enclos- stairway, installing automatic sprinkling King Co., to Viking Automatic Sprinkler 1120 8 Ave. S., Seattle, under **$50,000.**

Washington—GASOLINE FUELING SYS- —U. S. Eng., 800 3 Ave. Seattle, a.c. line fueling sys., Clallam Co., to J. W. ey, 228 9 Ave. N., Seattle, under **$50,000.**

†**Wyoming** — IMPROVEMENTS — U. S. Eng., 1709 Jackson St., Omaha, Neb., rvs., Laramie Co., to Peter Kiewit Sons' 1024 Omaha Natl. Bank Bldg., Omaha, and Big Horn Constr. Co., Sheridan, ,000-$1,000,000.

va Scotia—IMPROVEMENTS—Dpt. Na- l Defense for Air, Ottawa, Ont., imprvs., s., to Stewart Const. Co., Ltd., 7 Dufferin , Sherbrooke, Que. **$160,000.**

va Scotia—IMPROVEMENTS—Dpt. Na- al Defense for Air, Ottawa, Ont., addnl. rvs., to Tomlinson Const. Co., Ltd., Yar- th, **$190,000.**

LATIN AMERICA

exico—Monte de Piedad, Zocalo, Mexico, D. F., plans constructing model homes for king class people, **Mexico City**, total est. 50,000***Municipal Govt., Palacio Munici- Ciudad Juarez, Chihuahua, obtained loan m National Urban Mortgage & Public Works nk to finance building high and normal ools, imprv. drainage sys. and recondition- public market, **Ciudad Juarez**, Chihuahua, 0,000, also loan obtained for municipal ughter house, **Chihuahua City**, Chihuahua, ,000.

PUBLIC BUILDINGS

OPOSED WORK

†**Ala., Aliceville**—Pub. Housing Auth., NHA, orgia Savings Bank Bldg., Peachtree and ad Sts., Atlanta, Ga., 48 temporary struc- es, Ala. 1200.

†**Ala., Ozark**—Pub. Housing Auth., NHA, orgia Savings Bank Bldg., Peachtree and ad Sts., Atlanta, Ga., 100 temporary uctures, Ala. 1201.

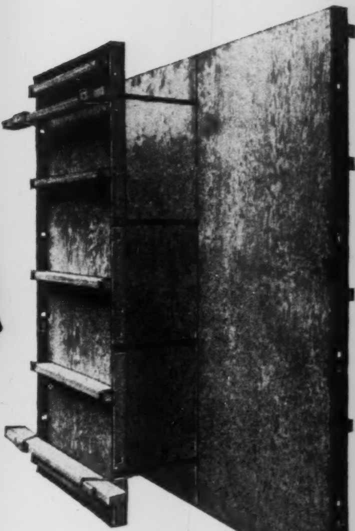
†**Arizona**—Pub. Housing Auth., NHA, 785 rket St., San Francisco, Calif., plans by her & Mahoney, 1100 Title & Trust Bldg., oenix, permanent units, Ariz. 6-1.

★†**California**—City and County of San Francisco Housing Auth., 525 Market St., San

DEFENSE AREA HOUSING

DEMANDS

UNI-FORM FOUNDATION UNITS FOR ECONOMY

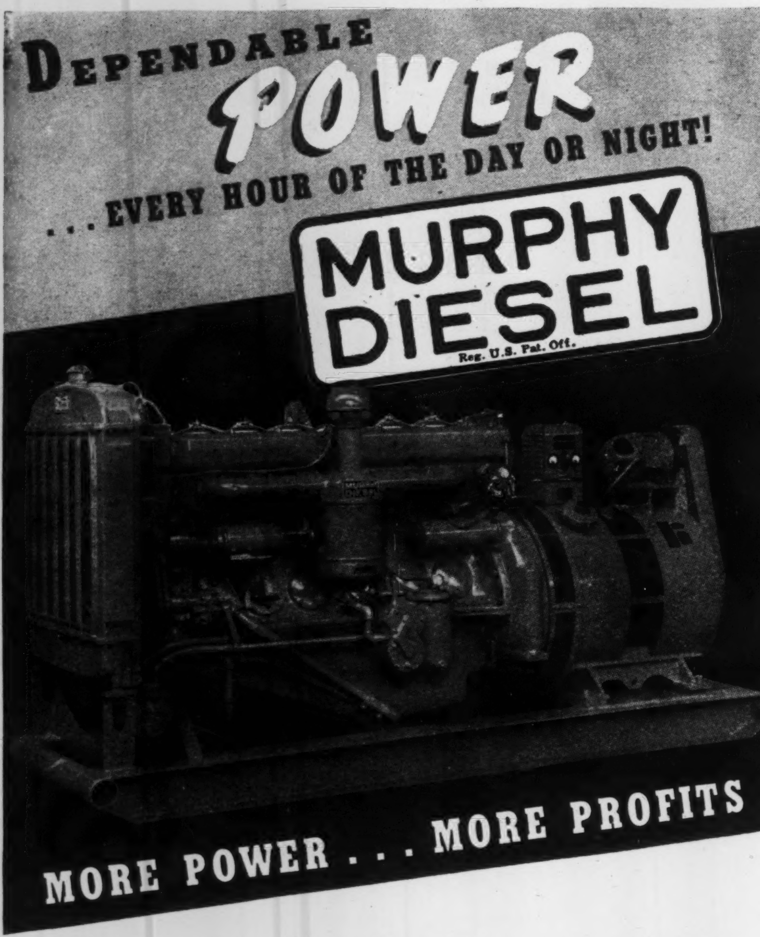


The low initial unit cost of Uni-Form Foundation Units . . . and their re-use economies . . . combine with savings on form erection and stripping to give the ideal time and money-saving advantages so necessary for mass construction of single family dwellings. This system permits the construction of monolithic concrete foundation walls at masonry wall costs. You help overcome manpower shortage, too, since one man can handle these light-weight forms and make set-ups quickly. You will find it definitely to your advantage to get full information on Uni-Form Foundation Units for Defense Area Housing.

Write Today for Full Catalog Description

Universal
FORM CLAMP CO.
1242 N. KOSTNER AVE., CHICAGO

BRANCHES AND DISTRIBUTORS IN ALL PRINCIPAL CITIES


DEPENDABLE POWER
. . . EVERY HOUR OF THE DAY OR NIGHT!
MURPHY DIESEL
Reg. U.S. Pat. Off.
MORE POWER . . . MORE PROFITS

Built for continuous heavy-duty service — rugged, compact, simple to operate — Murphy Diesel Generator Sets provide real operating economy and many years of reliable performance.

Available in sizes 60 to 115 K.W., AC or DC; engines in sizes 90 to 215 HP. Write for complete information.

MURPHY DIESEL COMPANY
MILWAUKEE, WISCONSIN

ALCO
ELECTRIC WELDED STEEL PIPE
For Permanent Installations

AMERICAN LOCOMOTIVE COMPANY
ALCO PRODUCTS DIVISION
30 CHURCH ST., NEW YORK, N. Y. DUNKIRK, N. Y.

Francisco, plans by W. Day, F
Center Bldg. and Harry Michelsen
Madrone St., San Francisco, dormitory
Cal. 4671; plans by Harvey Clark, 210
St. and Francis E. Lloyd, 50 Pine St
Francisco, family dwelling units, Cal 46
plans by E. Geoffrey Bangs 605 Marke
and Harry Moise, 605 Market St., San F
cisco, dormitory units, Cal. 4671; plan
Eldridge T. Spencer, 369 Pine St. and W
Ambrose, 244 Kearny St., San Fran
family dwellings, Cal 4664- for NHA.
3/5—ENR 3/11.

†California — Westvaco Chlorine Pro
Co., 405 Lexington Ave., New York, N
plant facilities. Approx. $,000. De
Plant Corporation will finan

†California—Pub. Housing Auth., NHA
Market St., San Francisco, plans by G. S
ley Wilson, 3616 Main St., Riverside, b
utilities for trailer camp, Cal. 4665.

†California—Pub. Housing Auth., NHA
Market St., San Francisco, plans by G. S
ley Wilson, 3616 Main St., Riverside, do
tory housing, Cal. 4662. CD -26—ENR

†California—Pub. Housing Auth., NHA
Market St., San Francisco, accommodat
for couples, Cal. 4666; family dwelling u
Cal. 4669; dormitory housing, Cal. 4670
Cal. 4671; accommodations for couples,
4668.

†Calif., Oceanside — Pub. Housing A
NHA, 785 Market St., San Francisco, 20
porary structures, Cal. 4663.

†Calif., Palm Springs—Pub. Housing A
NHA, 785 Market St., San Francisco,
dormitories, Cal. 4662.

★**†Calif., San Francisco**—Pub. Housing A
NHA, 785 Market St., San Francisco,
temporary structures, Cal. 4664; 700
apartments, Cal. 4666; 700 war apartm
Cal. 4668; 1,050 temporary housing, Cal. 46
500 dormitories, Cal. 4670; 500 dormito
Cal. 4671.

†Connecticut—Pub. Housing Auth., NH
24 School St., Boston, Mass., plans by El
Richmond, 174 Grand St., Waterbury, fa
ties for couples, Conn. 6042; family dw
ing units, Conn. 6043. CD 2/19—ENR

†D. C., Wash.—District Comrs., Dist
Bldg., abandoned construction medical gro
Project 49-140 and venereal group, Project
49-150, both at Gallinger Municipal Hosp
FWA. CD 12/3 and 11/23.

†Georgia—U. S. Eng., Conley, bldgs., Cla
ton Co.

†Ga., Thomasville — Pub. Housing Au
NHA, Georgia, Savings Bank Bldg., Peacht
and Broad Sts., Atlanta, 150 unit dormito
housing, Ga. 9150.

†Ill., Fithian—Dpt. Agriculture, Commodi
Credit Corp., Hemp Div., The Mall, 12 an
14 Sts. N.W., Wash., D. C., hemp mi
$100,000 without equip.

†Ill., Lexington—Dpt. Agriculture, Commod
ity Credit Corp., Hemp Div., The Mall,
and 14 Sts. N.W., Wash., D. C., hemp mi
$100,000 without equip.

†Ill., Wyoming—Dpt. Agriculture, Commodi
Credit Corp., Hemp Div., The Mall, 12 and 1
Sts. S.W., Wash., D. C., hemp mill $100,00
without equip.

†Kentucky—National Carbide Corp., 60 E
42 St., New York, N. Y., plant facilities
$280,000. Defense Plant Corp. will finance.

†La., Pineville—State Bd. Health, Dr. D. E
Brown, pres., Baton Rouge, plans by J. L
Scott, Littlefield Bldg., Austin, detentio
home for girls on grounds Huey P. Long
Hospital. Over $150,000. **FWA.**

†Me., Houlton—Pub. Housing Auth., NHA,
24 School St., Boston, Mass., 100 unit dormi
tory housing, Project Me 10705.

★**†Md., Baltimore** — Pub. Housing Auth.,
NHA, Temporary Bldg. 2, 19 and D Sts.
N.W., Wash., D. C., 750 unit housing, Md.
18250; 250 unit housing, Md. 18251; tem-
porarily deferred 650 unit housing, Md. 1825
150 unit housing, Md. 18253, and 200 unit
housing, Md. 18254.

Md., Hyattsville—Bd. Educ., Prince Georges
Co., Upper Marlboro, plans $400,000 bond elec-
tion high school.

†Md., Leonardtown—Comrs. St. Mary's Co.,
plans by J. J. Baldwin, 927 15 St., N. W.,
Wash., D. C., and bids soon, 2 story, brick
and cinder block courthouse and jail addn.,
Md. 18-182. $131,700. **FWA.** CD 1/28—ENR
2/4.

†Md., Marlboro—Bd. Educ. Prince Georges
Co., Upper Marlboro, plans $150,000 bond elec-
tion high school.

Md., Mt. Rainier—Bd. Educ. Prince Georges
Co., Upper Marlboro, plans $250,000 bond
election school.

†Md., Prince Frederick—Calvert County
Hospital, sketches made by J. J. Baldwin,
927 15 St. N. W., Wash., D. C., 2 story hos-
pital addn. **FWA.**

Md., Suitland—Bd. Educ. Prince Georges
Co., Upper Marlboro, plans $280,000 bond elec-
tion high school. CD 1/5—ENR 1/7.

★**†Md., Towson**—Pub. Bldgs. Admin., 601
State Planters Bank Bldg., Richmond,
Va., plans by J. R. Edmunds, Jr., Calvert
Bldg., Baltimore, hospital and nurses' home,
near here, Projects Md. 18-163 and Md. 18-
186. $855,000. **FWA.** CD 11/18—ENR 11/26.

†Massachusetts—Clifford Manufacturing Co.,
564 E. 1 St., Boston, addnl. plant facilities

IC BUILDINGS (Proposed Work, Cont'd.)

00. Defense Plant Corp. will finance.

ssachusetts—Pub. Housing Auth., NHA, hool St., Boston, plans by F. Franz, 70 uck St., Holyoke, housing, Mass. 19030. $150,000. CD 2/19—ENR 2/25.

achusetts—Pub. Housing Auth., NHA, hool St., Boston, plans by James H. e & Associates, 20 Newbury St., Boston, unit and couples housing, Mass. 19031. $150,000.

ss., Southbridge—Pub. Housing Auth., 24 School St., Boston, plans by Leland rsen, Statler Bldg., Boston, dormitories, 19082. CD 3/3.

ss., Southbridge—Pub. Housing Auth., 24 School St., Boston, 80 unit temporary g, Mass. 19083.

Mich., Saginaw — Pub. Housing Auth., HA, 9 St. and Prospect Ave., Cleveland, 0 unit temporary housing, Mich. 20175; nit temporary housing, Mich. 20178; 100 emporary housing, Mich. 20181.

Mississippi—Pub. Housing Auth., NHA, eorgia Savings Bank Bldg., Peachtree Broad Sts., Atlanta, Ga., dormitory type g dormitory units; units for couples; dwelling and dormitory type units. for couples and family dwellings, No. 2-3-4-5-6-7-8.

ississippi — Pub. Housing Auth., NHA, ia Savings Bank Bldg., Peachtree and d Sts., Atlanta, dormitory type housing, ct 20140-51.

ississippi—Pub. Housing Auth., NHA, ia Savings Bank Bldg., Peachtree and d Sts., Atlanta, Ga., family and dormitory ing.

Miss., Biloxi—Pub. Housing Auth., NHA, Georgia Savings Bank Bldg., Peachtree and d Sts., Atlanta, Ga., 550 unit dormitory ing, Miss-22150.

Miss., Gulfport—Pub. Housing Auth., NHA, Georgia Savings Bank Bldg., Peach- and Broad Sts., Atlanta, Ga., 500 unit itory housing, Miss-22152; 50 unit dormi- housing, Miss-22154; 130 unit war apart- ts, Miss 22156; 285 unit temporary housing, -22157; 40 unit temporary housing, Miss- 8.

Mo., McBride—Pub. Housing Auth., NHA, ks Bldg., 10 St. and Grand Ave., Kansas , Mo., 25 family unit housing.

Nebraska—U. S. Eng., 1709 Jackson St., ha, engineer-architect services and su- vision construction by Wyatt C. Hedrick , 1st Natl. Bank Bldg., Fort Worth, Tex., and Fillmore Counties.

Nebraska—U. S. Eng., 1709 Jackson St., aha, engineer-architect services and su- vision of construction by E. J. Tipton, Natl. Bank Bldg., Denver, Colo., Hall

N. J., Elizabeth—Pub. Bldgs. Admin., North erior Bldg., Wash., D. C., plans by A. fman, 259 N. Broad St., 1 story, bsmnt., 105 ft., temporary hospital and 78x126 ft., se's home for Elizabeth General Hospital. 0,000. **FWA.**

N. M., Hurley-Santa Rita—Pub. Housing th., NHA, 1309 Electric Bldg., Fort rth, Tex., plans by Christensen & Christen- , Thomas Bldg., Dallas, Tex., housing, 29160. CD 3/3.

North Carolina—U. S. Eng., Monroe, with- w bids to have been opened Mar. 8, addnl. gs., Union Co. CD 3/2.

Ohio—Dayton Metropolitan Housing Auth., rries Bldg., Dayton, plans by Dayton using Architects, c/o A. Schenck, 3rd tl. Bldg., Dayton, and bids soon, housing, NHA.

★ **†Ohio**—U. S. Eng., 925 New Federal Bldg., Pittsburgh, Pa., bldg., Cuyahoga Co. Total . $9,000,000. Wilbur Watson & Associates, 4 Prospect Ave., Cleveland, engrs.

†O., Windham—Federal Works Agency, 9 and Prospect Ave., Cleveland, plans by J. King, 100 E. Rayon St., Youngstown, story, brick, stone school. $288,500.

†Oregon—Pub. Housing Auth., NHA, Skin- r Bldg., Seattle, Wash., bids soon hous- g. $180,000.

★ **†Oregon**—Public Housing Auth., NHA, Skinner Bldg., 5 Ave. and Union St., attle, Wash., family housing $900,000.

★ **†Ore., Astoria**—Pub. Housing Auth., NHA, Skinner Bldg., 5 Ave. and Union St., attle, Wash., 20 unit war apartment hous- g, Ore-35250; 40 unit temporary housing re-35252; 40 unit war apartment housing, re-35251; 200 unit temporary housing, Ore- 253. CD 3/5.

†Pennsylvania—Branch Motor Express Co., E. Walnut St., Allentown, plant facilities, 20,000. Defense Plant Corp. will finance.

†Pa., Lancaster—Pub. Housing Auth., NHA, 0 Bway., New York, N. Y., 100 family unit ousing, Project Pa 36425.

†Pa., Williamsport—Pub. Housing Auth., HA, 270 Bway., New York, 150 unit dormi- ory housing, Pa. 36033.

†Rhode Island—Pub. Housing, NHA, 24 chool St., Boston, Mass., rejected bids Feb. 6, 1 story, 35x150 ft. community bldg., for ousing project RI 37011. Noel & Miller, 29 hames St., Newport, archts.

★ **†S. C., Charleston**—Pub. Housing Auth., NHA, Georgia Savings Bank Bldg., Peach- tree and Broad Sts., Atlanta, Ga., 600 unit

AMERICAN PENCIL CO. NEW YORK
VENUS
DRAWING
HB

"MODERNISTIC?—GR-R-R!"

Conventional, modern, *moderne*, modernistic—no one design can please everybody. But more draftsmen, architects and engineers like and use the Venus Drawing Pencil than any other make.

They know they can *rely* on the strength and smoothness of Venus Drawing. They know that each degree of hardness is exact and *unvarying*—whenever and wherever they buy.

Let the Venus Drawing Pencil speak for itself. Just mail us the coupon below—circling the two degrees you would like to try—and we will gladly send you *free* samples.

VENUS *Drawing* PENCILS

American Pencil Company
Dept. 126, 500 Willow Ave., Hoboken, N. J.
In Canada: Venus Pencil Company, Ltd., Toronto

Please send FREE samples of the two grades circled:
9H - 8H - 7H - 6H - 5H - 4H - 3H - 2H - H - F - HB - B - 2B - 3B - 4B - 5B - 6B

NAME and title ____________________

FIRM NAME ____________________

ADDRESS ____________________

CITY ____________ STATE ____________

LUFKIN

"ANCHOR" CHROME CLAD
STEEL TAPE

CHROME CLAD
THE LUFKIN RULE CO.
EASY TO READ MARKINGS THAT ARE DURABLE
EASY TO HANDLE
EASY TO READ

Engineers appreciate the many advantages of the Lufkin "Anchor" Chrome Clad Steel Tape. Jet black markings are easy to read against a satin chrome surface that won't rust, crack, chip or peel. Genuine leather hand-stitched case on a plated steel liner is exceptionally durable. Folding flush handle opened by a push pin and smooth winding mechanism make it easy to use. For general measuring work, the Lufkin "Anchor" simply can't be beaten. Write for free catalog.

BUY THROUGH YOUR DEALER

LUFKIN

SAGINAW, MICHIGAN • New York City
TAPES • RULES • PRECISION TOOLS

PUBLIC BUILDINGS (Proposed Work, Cont'd.)

temporary housing, SC-38075, 150 unit war apartments, SC-38076.

†S. C., North Charleston—School Dist. 4, plans by H. Tatum, 34 Broad St., Charleston, school at Liberty Hills housing project; plans by A. B. Myers, Charleston, school, Dorchester Rd. $225,000. **FWA.**

†Tennessee—Pub. Housing Auth., NHA, Georgia Savings Bank Bldg., Peachtree and Broad Sts., Atlanta, Ga., dormitory type housing, Tenn. 40072.

†Tenn., Dyersburg—Pub. Housing Auth., NHA, Georgia Savings Bank Bldg., Peachtree and Broad Sts., Atlanta, Ga., 72 unit dormitory housing, Tenn-40100; 80 unit war apartment housing, Tenn-40101. CD 12/29—ENR 1/7.

†Tenn., Paris—Pub. Housing Auth., NHA, Georgia Savings Bank Bldg., Peachtree and Broad Sts., Atlanta, Ga., 1,080 unit dormitory housing, Tenn-40072.

†Texas—Dow Magnesium Co., Midland, Mich., addnl. plant facilities. $335,000. Defense Plant Corp. will finance.

★ **†Texas**—Pub. Housing Auth., 1309 Electric Bldg., Fort Worth, plans by Clarkson, Pelich, Geren & Rady, Insurance Bldg., Fort Worth, housing, Proj. 41-225. CD 2/16—ENR 2/18.

†Texas—Pub. Housing Auth., NHA, 1309 Electric Bldg., Fort Worth, plans by Phelps, Dewees & Simmons, Majestic Bldg., San Antonio, family housing, Tex. 41-293; family apartments, Tex. 41-292. CD 2/16—ENR 2/18.

†Texas—Pub. Housing Auth., NHA, 1309 Electric Bldg., Fort Worth, plans by Sharp & Goodwin, 2nd Unit Santa Fe Bldg., Dallas, apartment housing, Tex. 41511, and family housing, Tex. 41512. Over $150,000. CD 2/16—ENR 2/18.

★ **†Texas**—Pub. Housing Auth., NHA, 1309 Electric Bldg., Fort Worth, plans by Smith, Pitts & Macpherson, Alamo Natl. Bldg., San Antonio, family housing, Tex. 41522; dormitory dwelling units, Tex. 41521; 100 unit trailer camp, Tex. 41523. CD 2/16—ENR 2/18.

†Texas — Pub. Housing Auth., NHA, 1309 Electric Bldg., Fort Worth, plans by Barthelme & Kiefner, Rte. 121, P. O. Box 189, Houston, family dwelling housing, Tex. 41-531 and apartment housing, Tex. 41-532. CD 2/16—ENR 2/18.

†Texas—U. S. Eng., Fort Sam Houston, addnl. bldgs., utilities, facilities, etc., Bastrop Co., $100,000-$500,000.

★ **†Texas**—Universal Corp., W. W. Ahslchlager, archt., Southland Life Bldg., Dallas, 1 story, armament manufacturing plant. $1,000,000. Federally financed.

†Tex., Gainesville — Pub. Housing Auth., NHA, 1309 Electric Bldg., Fort Worth, 35 unit temporary housing, Tex. 41550; 20 unit dormitory housing, Tex. 41551.

†Tex., Marfa—Pub. Housing Auth., NHA, 1309 Electric Bldg., Fort Worth, plans by Frazer & Benner, El Paso Natl. Bldg, El Paso, housing, Tex. 41393. CD 3/1—ENR 3/4.

†Tex., Pecos—Pub. Housing Auth., NHA, 1309 Electric Bldg., Fort Worth, plans by W. C. Hedrick, 1005 1st Natl. Bank Bldg., Fort Worth, dormitory housing, Tex. 41556 and dwellings, Tex. 41557 and Tex. 41558. CD 3/3.

†Va., Portsmouth—City, sketches by Rudolph, Cooke & Van Leeuwen, Norfolk, public health center. $60,000. **FWA.**

★ **†Washington**—Pasco Housing Auth., Pasco, plans by J. W. Maloney, Larson Bldg., Yakima, housing, Project 45200 $200,000, Project 45201 $300,000, and Project 45202 $150,000, for NHA.

†Washington—Tacoma Housing Auth., Tacoma, plans by Lea, Pearson & Richards, Provident Bldg., Tacoma, altering Bankers Trust Bldg. for dormitory, for NHA. $25,000.

★ **†Wash., Ephrata**—Pub. Housing Auth., NHA, Skinner Bldg., 5 Ave. and Union St., Seattle, 100 unit dormitory housing, Wash. 45203; 275 unit dormitory housing, Wash. 45204; 30 unit war apartment housing, Wash. 45205; 100 unit temporary housing, Wash. 45206. CD 3/3.

†Wash., Tacoma — Pub. Housing Auth., NHA, Skinner Bldg., 8 Ave. and Union St., Seattle, 110 dormitory unit housing, Project Wash. 45207.

†Wisconsin—Wehr Steel Co., 5234 W. Mobile St., West Allis, plans by H. I. Messmer, 231 W. Wisconsin Ave., Milwaukee, service bldg. $50,000. Federally financed. CD 3/2—ENR 3/4.

†Wisconsin—Du Pont Co., Carrollville, remodeling chemical plant for alcohol plant. Defense Plant Corp. will finance.

★ **†Wisconsin**—A. O. Smith Corp., 3533 N. 27 St., Milwaukee, plant addn. Over $23,000,000. Defense Plant Corp. will finance. CD 1/20—ENR 1/28.

†Wis., Merrimac—Federal Works Agency, 18 and F Sts. N.W., Wash., D. C., plans by Bogner, Darby, Law & Potter, 121 S. Pinckney St., Madison, school, Wis. 47031. $79,800.

★ **Alta., Edmonton**—Wartime Housing, Ltd., 55 York St., Toronto, Ont., bids soon 200 houses, for City. About $600,000. CD 2/24—ENR 3/4.

Alta., Edmonton—Secy. Dpt. Munitions & Supply, Ottawa, addnl. bldgs., officers' quarters, dispensary addn., etc. $167,000.

B. C., Vancouver—University of British Columbia, student dormitory, etc., bldg. $200,000.

"DRAFTIN
Oomph

Precision-ize Pencil Drawings

Sharp Prints without Inking

Relieve Draftsmen Shortage

Speed Production Time

Cut Operating Costs

Make Old Boards Better Than N

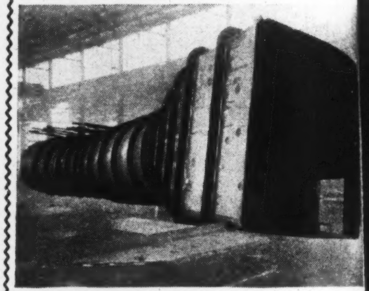
LONG PRODUCT

Cover worn-out boards. Make new bo
more efficient. Most perfect drawing su
yet conceived. In use in over 1000 pla
Costs very little. Write for details and
offer on NO-INK DRAWING BOARD T

Yes, Immediate Delivery!

W. H. LONG CO., 425 N. CLARK ST., CHICAGO—EST.

PENSTOCKS



Designed for quality, economy and long life. Fabricated from Class "A" steel, alloy steel or wrought iron.

Consult Lancaster's experienced engineers when you have a problem in fabricated steel plate work. Complete designs and estimates will be submitted with no obligation to you. Write, 'phone or wire today.

LANCASTER IRON WORKS, INC.
LANCASTER, PENNA.

BUILDINGS (Proposed Work, Cont'd.)

London—Dpt. P. Wks., Ottawa, 1st
hospital pavilions near military hos-
ldgs., Westminster Twp. Total est.

SKED

Bids Asked After March 9

sylvania — Beaver County Housing
P. O. Box 181, Beaver, 50 unit tem-
dwellings, Pa-36307 and 250 unit tem-
family dwellings Pa-36308 in Beaver
NHA. Extended date. Plans deposit
ousing Architects of Beaver County,
St., Monaca, archts. CD 2/19—ENR

Bids Asked After March 10

Geneva—Pub. Housing Auth., NHA,
ay., New York, N. Y., site work and
for 160 trailers. Pa-36354. Plans de-
50. G. M. D. Lewis, Scranton Life In-
Bldg., Scranton, archts.

consin—Dpt. Agriculture, Hemp Div.
dity Credit Corp., The Mall, 12 to 14
W., Wash., D. C., hemp mill. $145,000.
—ENR 2/11.

consin—Dpt. Agriculture, Hemp Div.
dity Credit Corp., The Mall, 12 to 14
W., Wash., D. C., hemp mill. $145,000.
/8—ENR 12/10.

consin—Dpt. Agriculture, Hemp Div.
dity Credit Corp., The Mall, 12 to 14
W., Wash., D. C., hemp mill. $145,000.
/8—ENR 12/10.

consin — Dpt. Agriculture, Hemp Div.
dity Credit Corp., The Mall, 12 to 14
W., Wash., D. C., hemp mill. $145,000.
/8—ENR 12/10.

consin — Dpt. Agriculture Hemp Div.
dity Credit Corp., The Mall, 12 to 14
W., Wash., D. C., hemp mill. $145,000.
19—ENR 1/21.

consin—Dpt. Agriculture, Hemp Div.
dity Credit Corp., The Mall, 12 to 14
W., Wash., D. C., hemp mill. $145,000.

Bids Asked March 15

S., Debert—Secy. Dpt. Munitions & Sup-
Ottawa, Ont., ordnance bldgs., for Dpt.
nal Defense (Army), Ottawa, Ont.

Bids Asked After March 15

Connecticut—Pub. Housing Auth., NHA,
hool St., Boston, Mass., temporary hous-
nits, Conn. 6182; temporary units, Conn.
Over $150,000. CD 2/15—ENR 2/18.

nnecticut—Pub. Housing Auth., NHA,
chool St., Boston, Mass., housing site
s., etc., Conn. 6183 and 6184. CD
—ENR 2/25.

West Virginia—U. S. Eng., 130 S. Queens
., Martinsburg, hospital bldgs., Groups
nd E Martinsburgh General Hospital,
eley Co. Contract awarded soon on
A. Wm. A. Goff, 1411 Broad St. Sta.
Phila., Pa., archt.

Bids Asked March 16

C., Wash.—Alley Dwelling Auth., 1737
N.W., Wash., D. C., housing, Georgia
Project. DC 49060, for NHA. CD
—ENR 12/31.

assachusetts—Pub. Housing Auth., NHA,
chool St., Boston, housing, community
garage, paint shop, utilities, overhead
rical distr. sys., MASS 19029. Over
000. Plans deposit $50 first set and $10
addnl. set. J. M. Gray, 175 High St.,
on, archt. CD 2/26—ENR 3/4.

d., Franklin—Pub. Bldgs. Admin., North
rior Bldg., Wash., D. C., federal recrea-
bldg., Docket Ind. 12-188. **FWA.** CD
—ENR 2/4.

Bids Asked March 17

isconsin—Pub. Housing Auth., NHA, 201
Wells St., Chicago, Ill., 1 story, 35x91
frame and concrete block administration
for Project Wis. 47021. Plans deposit
Gordon J. Feldhausen & G. C. Coughlen,
n Bay, archts.

ue., Farnham—Secretary Dpt. Munitions
Supply, Ottawa, Ont., O.M.E. workshop,
Dpt. National Defense (Army), Ottawa,
$45,00. CD 1/7—ENR 1/22.

Bids Asked March 18

†Illinois—Pub. Housing Auth., NHA, 201
Wells St., Chicago, housing, Projects
11191 and Ill. 11192. CD 3/2—ENR 3/4.

★ **†N. J., Bridgeton**—Pub. Housing Auth.,
NHA, 270 Bway., New York, N. Y., 750
t dormitory housing, NJ-28141. Tenta-
e date. Plans deposit $50. R. Bayne
illiams & Henry S. Churchill, Architects
sociates, 56 W. 55 St., New York, N. Y.,
hts. CD 2/25—ENR 3/4.

Bids Asked March 19

★ **†Md., Cheverly**—Federal Works Agency,
18 and F Sts. N.W., Wash., D. C., hospital
d nurses home, Proj. Md. 18-148. $600,000.
a, Ross & Walton, Hyattsville, archts.
D 10/30—ENR 11/12.

★ **†Nebraska**—Pub. Housing Auth., NHA,
10 E. 17 St., Kansas City, Mo., housing,
ojects Neb. 20532-33. $1,800,000. Davis &
ilson, 757 Stuart Bldg., Lincoln, archts.
D 2/25—ENR 3/4.

Bids Asked March 20

†Arizona—Pub. Housing Auth., NHA, 785
arket St., San Francisco, Calif., trailer

WHY **NAYLOR**
OUT-PERFORMS ALL OTHER
LIGHT-WEIGHT PIPE

THE EXCLUSIVE
LOCKSEAM SPIRALWELD
MAKES *ALL* THE DIFFERENCE

Naylor Pipe is a natural for contractors because it offers so many performance advantages and savings. The exclusive Lockseam Spiralweld creates a structure that is light in weight, easy to handle, simple to assemble and readily knocked-down when the job is done. It's leak-tight, stronger and safer. The heel of the spiral acts as a continuous expansion joint through the line—absorbing shock loads, stresses and strains. Naylor's concentric ends simplify connections. Contractors like the way they can change from one connection to another, right in the field. There's no other pipe like it.

SAVES steel
SAVES weight
SPEEDS installation
EASIER to handle
LEAK-TIGHT, safer
ABSORBS shock loads
HANDLES jobs normally requiring heavier-wall pipe
CONNECTIONS to fit your needs
SAVES money

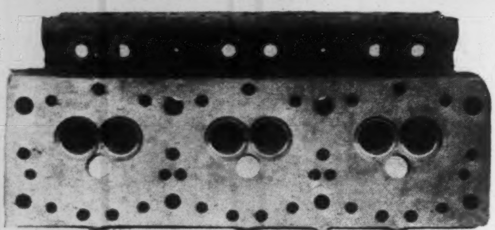
NAYLOR PIPE SERVICE
Dredging . . Hydraulic Sluicing . . De-Watering . . Ventilating . . Exhaust and Intake . . Gas Gathering . . Pulp Lines . . Vacuum Lines . . and other high or low pressure lines

Sizes from 4" to 30" in diameter—thickness from 14 to 8 gauge—lengths up to 40 feet. All types of fittings, connections and fabrication. Write for catalog.

Naylor

NAYLOR PIPE COMPANY
1248 East 92nd Street, Chicago, Illinois

Cracked DIESEL CYLINDER HEADS MADE EQUAL TO NEW



WITH A "NEW PART" GUARANTEE!

A NATIONWIDE SERVICE

The expense of lost time, labor removing and replacing, etc., your cracked Diesel cylinder heads, is far, too great to gamble with.

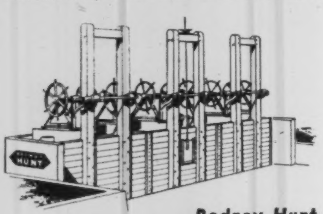
When you have your heads completely reconditioned by the Stark 10 Point Process you get them back guaranteed equal to new.

Profit from the experience of ,contractors and equipment dealers throughout the country, and send your cracked heads to Stark.

Details will be gladly furnished.

RALPH STARK INC.. SPECIALIZED RECONDITIONING

43-12 Thirty-third St.,
Long Island City, N. Y.



Rodney Hunt
SLUICE GATES

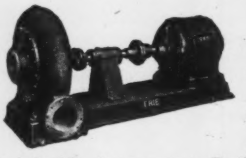
Are you interested in metal or timber sluice gates? Also hoists, stands or other water controlling apparatus? Rodney Hunt has over 100 years' experience making this type of equipment.

Write for special catalog today.

RODNEY HUNT MACHINE COMPANY
79 Lake St. Orange, Mass., U. S. A.

ERIE DREDGE PUMPS

MOTOR DRIVEN



For over 50 years users everywhere have found them a most profitable investment. Built for hardest service in handling sand and gravel. *See Bulletin* 45.

ERIE PUMP & ENGINE WORKS
152 Glenwood Ave., Medina, N. Y.

For Your Convenience

ENGINEERING NEWS-RECORD
330 West 42nd St., New York City

Please change my mailing address from:

Name .... Street ....
City .... State ....

TO

Street .... City .... State ....
Company .... Position ....
Nature of Business .... ENR 3-11

PUBLIC BLDGS. (Bids Asked, Cont'd.)

camp, Ariz. 2291. Gilmore & Varne Luhrs Bldg., Phoenix, archts. CD ENR 2/18.

†Massachusetts—Pub. Housing Auth. 24 School St., Boston, family housing munity housing, garage and pain MASS 19028. Plans deposit $50 first se $10 each addnl. set. M. A. Dyer, St., Boston, archt. CD 2/2—ENR 3/4

Bids Asked March 22

†Oregon — Portland Housing Auth. land, dormitory housing, Proj. 35201 3/1—ENR 3/4.

★**N. B., Renacco (near Newcastle)**—tary Dpt. Munitions & Supply, Ont., administration bldg., barracks, and rating quarters, mess and drill etc., Naval Training Center, for Dpt. Na Defense for Sea, Ottawa, Ont. About 500,000. CD 3/11/42—ENR 3/26/42.

Bids Asked March 23

†N. J., Paterson—Paterson General H tal, 528 Market St., altering hospital, 000. **FWA.** F. Vreeland, 140 Marke archt. H. D. Allen, 105 Halsey St., New engr. CD 10/21—ENR 10/29.

Bids Asked March

★**†Md., Bethesda** — Pub. Bldgs. Adm North Interior Bldg., Wash., D. C story hospital and nurses' home, Md. for Chevy-Chase Bethesda Hospital $650 **FWA.** Extended date. Faulkner & K bury, 917 15 St. N.W., Wash., D. C., an CD 3/3—ENR 10/22.

Bids Asked March 30

Mo., St. Louis—City, c/o C. H. Ellaby, Bd. Pub. Serv., 304 City Hall, painting terior new hospital bldg., kitchen and bldg., corridors, City Hospital 1, Carroll between St. Ange Ave. and Grattan St. tion Bridges & Bldgs., W. Crecelius, ch. 301 City Hall, archt.

Bids Asked

†D. C., Wash.—Alley Dwelling Auth., L St. N.W., Fort Dupont Dwellings Proj. DC 41-5, for NHA. Extended date 2/26—ENR 3/4.

†Md., Sandy Spring — Montgomery Cou General Hospital, Olney, altering, construc ing 2 story, brick, concrete or cinder hospital addn., Md. 18-160. $115, **FWA.** G. L. Howe, 917 15 St. N.W., Was D. C., archt. CD 12/10—ENR 12/17.

†Massachusetts—Bethlehem Steel Co., Howard St., Quincy (selected list bidde brick welding bldg., etc. Federally finan

†New Mexico—Pub. Housing Auth. NH 1309 Electric Bldg., Fort Worth, Tex., dorm tory unit housing, NM 29131, accommo tions for couples, NM 29132, and fam housing, NM 29133. Extended date. Hayn Strange, Parkhill, Voelcker & Dixon J. Schaeffer, 702 Main St., Lubbock, T archts. CD 2/18—ENR 2/18.

†New Mexico—U. S. Eng., Albuquerq addnl. cold storage unit, facilities, H Co. Over $40,000. Plans deposit $50

†Rhode Island—Newport Housing Auth., Park Holm, Newport, 1 story, 120x150 recreation maintenance unit, incl. repair sh RI 37013, for NHA. Plans deposit $50 set and $10 each addnl. set. Howe & Pro 1016 Turk's Head Bldg., Providence, arch CD 12/2—ENR 12/10.

†Texas — Pub. Housing Auth., NHA, 1 Electric Bldg., Fort Worth, dirt work a landscaping for housing. Plans deposit Giesecke, Kuehne & Brooks, Littlefield Bld Austin, engr.

†Texas—Pub. Housing Auth., NHA, 1 Electric Bldg., dormitory housing, Tex. 41- housing for couples, Tex. 41-502, family ho ing, Tex. 41-503. Haynes, Strange & Parkhi Voelcker & Dixon. Plans deposit $50 ea project. Myrick Bldg., Lubbock, archts. 2/16—ENR 2/18.

Ont., London—Secy. Dpt. Munitions & Sup ply, Ottawa, bldgs. for Dpt. National Defe (Army), Ottawa. $118,000.

LOW BIDDERS

†Alabama—Huntsville Housing Auth., Fe 26, apartments and community bldg. Ala. 10 for NHA, from Ray M. Lee Co., 337 W. Peach tree St. Atlanta, Ga., **$384.461.** CD 1/15—ENR 1/21.

†Arkansas—Pub. Housing Auth., NHA Electric Bldg., 7 and Taylor Sts., Fo Worth, Tex., Mar. 2, dwelling units, Ar 3093 and Ark. 3094, from Thos. P. Cooga Inc., Little Rock, Ark., **$479,648.** CD 2/18—ENR 2/25.

†Arkansas—Pub. Housing Auth., NHA 1309 Electric Bldg., Fort Worth, Tex., Ma 2, housing, Projects Ark. 3082 and Ark. 308 from F. G. Newton, Hattiesburg, Miss. **$497,999.** CD 2/18—ENR 2/25.

†California—U. S. Eng., 751 S. Figueroa St. Los Angeles, Mar. 1, altering bldg., No. 113 Los Angeles Co., from R. J. Daum, 6803 Wes Blvd., Inglewood, less than **$500,000.**

†California—Kern Co. Housing Auth., 51 Roberts Lane, Bakersfield, Mar. 2, dormitorie Cal 4551, 2-person family units Cal 4552, an family units Cal 4553, for NHA, from R. A Wattson Co., 1026 N. McCadden Pl., and Kemp Bros., 2900 Hyde Park Blvd., Los Angeles, **$411,384.** CD 2/8—ENR 2/11.

C BLDGS. (Low Bidders, Cont'd.)

fornia — Upland City Housing Auth., all, Upland, permanent housing, Project 9-1 and Cal. 9-2, for NHA, from John Jr., 8517 W. 3 St., Los Angeles, 74. CD 1/20—ENR 1/28.

Marion—Veterans Admin., Vermont etween H and I Sts. N.W., Wash., D. C., clinical bldg. No. 24, and connecting ors, from A. Farnell Blair Constr. Co., ur, Ga., **$345,385.** CD 2/12—ENR 2/18.

h., Saginaw—F. K. Anderson, chn. Com., Saginaw, General Hospital, Mar. pital bldg. and new nurses home addns., tions, Mich. 20-125, from Coath & 228 N. La Salle St., Chicago, Ill., 19. **FWA.** CD 2/17/43—ENR 4/2/42.

w Mexico—Pub. Housing Auth., NHA, Electric Bldg., Fort Worth, Tex., Mar. ousing, Projects NM 29062 and NM from Price, Nicholson & Boyington, W. Main St., Oklahoma City, Okla., 00. CD 2/18—ENR 2/11.

New York—Pub. Housing Auth., NHA, Bway., New York, Mar. 2, housing, cts NY 30092 and NY 30093, from Rath-Walsh, Inc., 184 N. Main St., Portchester, 00. CD 2/25—ENR 2/18.

Oregon—U. S. Maritime Comn., 14 St. between E St. and Constitution Ave. N.W., D. C., Mar. 6, dormitories, from ers & Jolivette, Railway Exchange Bldg., and, **$2,458,869.** CD 2/25—ENR 3/4.

Pennsylvania—Pittsburgh Housing Auth., Terrace Village, Pittsburgh, Mar. 5, hous-Project Pa. 1-6, for NHA, from Navarro 6219 Broad St., Pittsburgh, base bids **2,184,000, (2) $2,116,000.** CD 2/24—ENR

exas—U. S. Eng., 25 St. and Avenue F, eston, addnl. bldgs., exten. underground ies, Solic. 359-43-C39, Harris Co., from -Marshall Co., 4009 Center St., Houston, **000-$500,000.**

Washington—U. S. Maritime Comn., 14 St. between E St. and Constitution Ave., Wash., D. C., Mar. 6, dormitories, from ers & Jolivette, Railway Exchange Bldg., land, Ore., **$4,124,327.** CD 3/2—ENR 3/4.

TRACTS AWARDED

Alabama—Pub. Housing Auth., NHA, Georgia Savings Bank Bldg., Peachtree Broad Sts., Atlanta, Ga., site imprv., ties community bldg., infirmaries, etc., 1163-B, to Daugette-Millican Co., Gads-**$520,000.** Bids 2/26. CD 2/23—ENR 3/3.

Alabama—Reynolds Alloys Corp., Sheffield, nl mfg. bldgs., to Andrew Weston Co., 42 St., New York, N. Y. Est. **$3,500,000.** erally financed. W. J. Knight & Co., nright Bldg., St. Louis, Mo., engrs.

Alabama—U. S. Eng., Montgomery bldg., ities, Montgomery Co., to A. Berney Jones 49 Monroe St., Montgomery. Est. **$100,-** Bids 2/23.

Arkansas—Pub. Housing Auth., NHA, ctric Bldg., 7 and Taylor Sts., Fort Worth, accommodations for couples, Ark 3112 family units Ark 3113, to Linebarger str. Co., Rector Bldg., Little Rock, **$555,-** Awarded 3/5. CD 3/8, under LB—R 2/25.

Ala., Talladega — Talladega County Bd. uc., Talladega, school addns., Ala. 1-186, to rbury-Boriss Constr. Co., Massey Bldg., mingham. Est. about **$199,000. FWA.** s 2/26. CD 4/7—ENR 4/9.

†Arizona—Pub. Housing Auth., NHA, 785 rket St., San Francisco, Calif., temporary elling units, Ariz.-2063, to R. J. Daum, 3 West Blvd., Inglewood, **$198,446.** Bids 7. CD 2/2—ENR 2/4.

†Arkansas—Pub. Housing Auth., NHA, 1309 ctric Bldg., Fort Worth, Tex., housing, ojects Ark. 3072 and Ark. 3073, to J. W. teson Co., Dallas, Tex., **$371,998.** Bids 27, awarded 3/1. CD 2/18—ENR 2/11.

†California—U. S. Eng., 751 S. Figueroa St., s Angeles, bldg. expansion, No. 274, River-e Co., to A. Honer, 103 E. 3 St., Santa ta, under **$500,000.**

†California—U. S. Eng., 1209 8 St., Sacramento, line maintenance shed, appurtenant cilities, Kern Co., to Carter & Fowler, 400 St., Bakersfield, under **$50,000.**

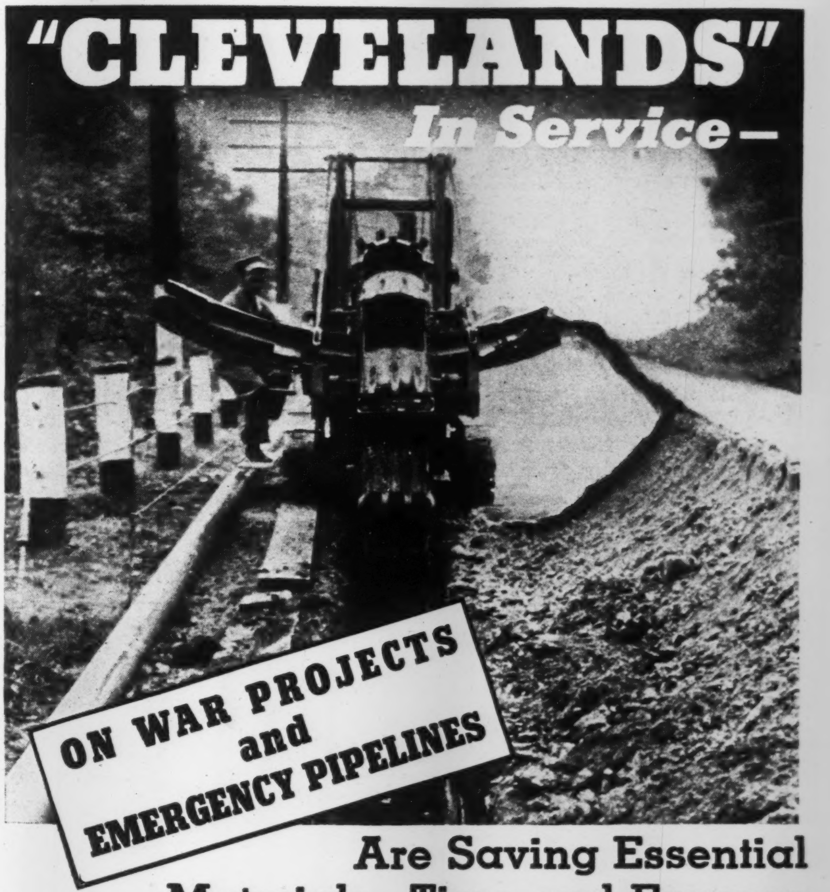
†California—U. S. Eng., 1209 8 St., Sacramento, line maintenance shed, appurtenant cilities, Kern Co., to Guy E. Ball, Bakers-ld, under **$50,000.**

†California—U. S. Eng., 1209 8 St., Sacramento, line maintenance shed, appurtenant cilities, Kings Co. to Lawrence Constr. Co., 11 E. Curtis Pk. Dr., Sacramento, under 0,000.

†California—U. S. Eng., 1209 8 St., Sacramento, line maintenance shed, appurtenant cilities, Merced Co., to Harris Constr. Co., 4 Palm St., Fresno, under **$50,000.**

†California—U. S. Eng., 1209 8 St., Sacramento, exten. central steam plant, Sacramento o., to C. C. Moore & Co., Engineers, Inc., 450 ission St., San Francisco, **$100,000-$500,000.**

†California—U. S. Eng., 1209 8 St., Sacramento, line maintenance shed, appurtenant



Are Saving Essential Materials—Time and Expense

With "CLEVELANDS" on the trenching jobs every move is a faster move, every unit of work is done with less fuel, less essential materials and at less expense. Thus "CLEVELANDS" are in tune with war production demands.

Their weight-saving design releases thousands of tons of steel for war production—their exceptional maneuverability and compactness assures quick loading on freight car or truck and saves valuable space—their correct engineering conserves oil and gasoline—and their sturdy construction, coupled with the finest material, assures hundreds of hours of operation without major repairs.

On thousands of miles of pipe line and on many government projects "CLEVELANDS" have delivered maximum performance.

THE CLEVELAND TRENCHER COMPANY
20100 ST. CLAIR AVE. "Pioneer of the Small Trencher" CLEVELAND, OHIO
"CLEVELANDS" Save More . . . Because they Do More

PILES
CONCRETE
WOOD
STEEL
SINCE 1910
MacARTHUR
CONCRETE PILE
CORPORATION, 18 EAST 48 ST., NEW YORK
BOSTON • CINCINNATI • NEW ORLEANS
CLEVELAND • PITTSBURGH

DRILLING
ANYWHERE

We look
into
the earth
PENNSYLVANIA
DRILLING COMPANY
PITTSBURGH, PA.

DRIVE MORE PILES

IN LESS TIME!

In driving piles—as in every other job today—the important thing is to SPEED UP THE WORK! *Time* is vital, so time must not be lost through holdups due to driving "problems." American All-Steel Pile Shoes for wood piles and pre-cast concrete piles are specially designed to save time and trouble. *Every hammer blow counts* with American Pile Shoes because they penetrate FASTER and DEEPER with fewer blows. They are SAFER—their stability provides low-cost insurance for superstructures. They are CHEAPER—proven money-savers on many well-known construction jobs. They are EASY TO APPLY. And they are AVAILABLE promptly from warehouse stocks!

Check These 5

AMERICAN FEATURES

1 *Nail holes permit easy, fast permanent application.*

2 *"Bending" hole assures snug fit to sides of slightly smaller piles. "Wings" will quickly take proper contour under a hammer blow.*

3 *Sides are made of two sturdy 1/4" steel shapes.*

4 *Shoe is assembled by careful welding with coated wire.*

5 *Sharpened point is produced from solid steel bar stock.*

AMERICAN
ALL-STEEL
PILE SHOES

THE AMERICAN PULLEY COMPANY • PHILADELPHIA, PA.

Our best "BUFF" salesman is the satisfied engineer who owns one and gladly tells of his accurate work. (26,000 "BUFF" Engineers).

Rental Transits — Reasonable Rates. Send for handsome new catalog #491

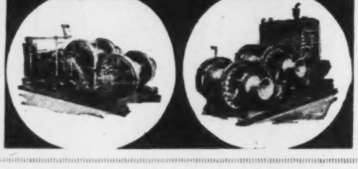
BUFF & BUFF INSTITUTE
J. P., Boston, Mass.

The BUFF "X" TELESCOPE has the finest and highest definition and simplest lens system. It is useful when the light is dim.

THOMAS
HOISTS

FINEST QUALITY
AT NO PREMIUM

THOMAS HOIST CO.
20 So. Hoyne Ave., Chicago, Illinois



facilities, San Joaquin Co., to Giles & Stockton, under **$50,000.**

†California—U. S. Eng., 209 S St., mento, warehouses, appurtenant fa Contra Costa Co., to Standard Building Ave. and Judah St., San Francisco, **$50,000.**

†California—U. S. Eng., 74 New gomery St., San Francisco, heating bldgs., Monterey Co., to Salinas Comm Co., 207 Abbott St., Salinas. Awarded

★ **†Calif., Hunters Point**—Yards & Navy Dpt., 18 St. and Constitution N.W., Wash., D. C., addnl. facilities, naval docks, S.A. No. 3, NOY 512 to Barr Hilp, 918 Harrison St., San Francisco, **300.** Addnl. to 8/25—ENR 8/27 under

★ **†Delaware**—Pub. Housing Auth., Temporary Bldg. 2, 19 and D Sts Wash., D. C., apartment housing and housing, Del-7033, to M. Shapiro & Son Co., Inc., 254 W. 54 St., New York, **$1,250,000.** CD 2/1—ENR 2/4.

†Florida—U. S. Eng., U. S. Courthouse Post Office, Jacksonville, warehouse Neg.-Jot.-43-2, Duval Co., to Gallespie structing Co., Inc., 220 W. Church St., sonville, less than **$50,000.** Awarded 2/

★ **†Florida**—U. S. Eng., Court Jacksonville, bldgs., Dade Co., to Cha & Lund, 3900 Georgia Ave., West Beach, **$500,000-$1,000,000.**

†Georgia—U. S. Eng., 494 Spring St. Atlanta, Sect. 1, bldg., incl. clearing, gra paving, drainage, Floyd Co., to MacDou Constr. Co., Hemphill Ave. N.W., Atla **$100,000-$500,000.**

†Illinois—U. S. Eng., 800 U. S. Courth & Custom House, St. Louis, Mo., instal warm air heating facilities in 2 bldgs., St. Clair Co., to Bumiller & Meyersieck, 340 S. Jefferson Ave., St. Louis, Mo. Est. un **$50,000.**

†Illinois—U. S. Eng., 520 Merchandise Ma Chicago, heat insulation for piping in var bldgs., Cook Co., to W. J. Denshoe, Chica **$50,000-$100,000.**

†Ind., Fort Wayne—Fort Wayne Hous Corp., A. G. W. Curdes, pres., 817 Citiz Trust Bldg., sixty 2 story, frame dwell units, New Haven Ave., for NHA, to D. Hoopengarner, Zanesville. Est. $240 Home Builders Plan Service, 124 W. Way St., archts. Awarded 2/26.

Louisiana—U. S. Eng., 25 St. and Avenue Galveston, Tex., bldg., W-359-43 N-06 Chris Larsen Co., Maritime Bldg., N Orleans.

★ **†Maryland** — Pub. Housing Auth., NH Temporary Bldg. 2, 19 and D Sts. N Wash., D. C., housing, Projects Md. 18014 a 18015, to Durham & Irvine, 1713 Rittenho Sq., Phila., Pa., **$545,000.** Bids 2/8. CD 2 ENR 2/25, under LB.

†Massachusetts—U. S. Eng., Park Squa Bldg., Boston, temporary bldgs., No. 175- NEG 241, Barnstable Co., to F. Grande Son Constr. Co., 425 Bway., Everett. **$100,000-$500,000.** CD 3/2—ENR 3/4.

†Massachusetts—U. S. Eng., Park Squa Bldg., Boston, temporary bldgs., No. 175- 249, Middlesex Co., to John Bowen Co., Newbury St., Boston. Est. **$100,000-$500,** CD 3/8—ENR 3/11.

★ **†Michigan**—U. S. Eng., 700 Union Guardi Bldg., Detroit, dismantle and move exis ing bldgs. at designated locations and ere ing same, also constructing T.O. type bldg roads, walks and electrical distr., Jackson to Owen-Ames-Kimball, 38 Pearl St. N Grand Rapids, less than **$1,000,000.**

†Michigan—Pub. Housing Auth., NHA, Ba lum Tower, Detroit, constructing Willow Pa site of trailers, grading, utilities, sidewalk etc., No. 20113, to O. W. Burke Co., Fish Bldg., Detroit, **$231,800.**

Michigan—Packard Motor Car Co., E. Gra Blvd., Detroit, brick, steel, concrete test ce for bldgs., to Barton-Malow Co., 2631 Woo ward Ave., Detroit. Federally financed.

★ **†Michigan**—U. S. Eng., 700 Union Guardi Bldg., Detroit, office bldg., Wayne Co., W. E. Wood Co., 4649 Humbolt St., Detro less than **$1,000,000.**

★ **†Mississippi**—Pub. Housing Auth., NH Georgia Savings Bank Bldg., Peachtree a Broad Sts., Atlanta, Ga., dormitory apar ments and family housing, Projects Mi 22072 and 22073, to F. T. Newton, 122½ Front St., Hattiesburg, **$617,999.** Bids 2/ CD 3/2—ENR 3/4.

★ **†Mississippi**—U. S. Eng., U. S. Courthou & Customhouse, Mobile, Ala., bldg., Hin Co., to C. H. Treadwell, 1523 Centenary Blv Shreveport. Est. under **$1,000,000.**

★ **†Mississippi**—Pub. Housing Auth., NH Georgia Savings Bank Bldg., Peachtre and Broad Sts., Atlanta, Ga., housing Projects Miss. 22092 and 22093, to L Constr. Co., 1467 Lamar Ave., Memphi Tenn., **$599,215.** Bids 2/27. CD 2/24—EN 2/11.

†New Jersey — Curtiss-Wright Propell Div., Fairfield Rd., Caldwell, 1 and 2 story 121x143 ft. concrete block, rein.-con. pro peller test bldg., to Mahony-Troast Corp 657 Main Ave., Passaic. Federally finance Albert Kahn Assoc. Eng. & Archts., 345 Ne Center Bldg., Detroit, Mich., engrs. an archts.

★ **†New York**—Pub. Housing Auth., NHA 270 Bway., New York, site work and uti ities for housing projects N.Y. 30131 an

IC BLDGS. (Contracts Awarded, Cont'd.)

to Delval Constr. Co., Harwd Bldg., dale. **$639,241.** CD 2/18—ENR 2/25 LB.

w York—U. S. Eng., 819 Industrial Trust Providence, R. I., temporary bldgs., k Co., to M. Spinelli & Sons Co., Inc., 38 ncy St., Boston, Mass., **$100,000-$500,000.**

. Y., Niagara Falls—Pub. Housing Auth., HA. 270 Bway., New York, structures for ings, Proj. 30131, to Border Building Co., heridan Ave., Buffalo, John A. Johnson & Inc., 270 41 St., Brooklyn and M. Shapiro ns, 254 W. 54 St., New York, **$2,140,392;** ings, Proj. 30133, to Bush Constr. Co., exington Ave., New York, **$883,050.** CD —ENR 11/19.

Ohio—Pub. Housing Auth., NHA, 9 St. nd Prospect Ave., Cleveland, housing, to stein Constr. Co., 573 E. Talmadge St., n, **$849,700.** Awarded 2/26.

hio—Pub. Housing Auth., NHA, 9 St. and pect Ave., Cleveland, imprv. site and in- ng utilities for trailer homes, to Honagan Urbana, **$35,060.**

hio—U. S. Eng., U. S. Post Office & Court- e. Cincinnati, general contract bldgs., klin Co., to Robert H. Evans Co., 395 E. d St., Columbus***plumbing, heating, to man-Wolfe, Inc., 669 N. High St., Colum- **electrical work, to Electric Power & pment Co., 57 E. Chestnut St., Columbus.

†Ohio—U. S. Eng., 700 Union Guardian Bldg., Detroit, Mich., boiler house 2, Allen to W. B. Van Sickle Co., 1623 St. Clair Cleveland, less than **$1,000,000.**

Hamilton—Installing piping at municipal ric light plant, to Peck, Hannaford & gs, Court and Sycamore Sts., Cincinnati, **950.** Froelich & Emery, Toledo Trust ., Toledo, engrs.

†Pennsylvania—Montgomery County Housing h., Pottstown, housing, Project 12-2, for A, to Triangle Engr. Co., 101 Park Ave., York, N. Y., **$345,700;** electrical work, to ward P. Foley Co. Inc., 108 E. Read St., timore, Md., **$16,890.** Bids 3/2. CD 2/25— R 2/18.

†Pennsylvania — Philadelphia Housing Auth., 21 St. and Parkway, Phila., hous- Project Pa. 36362, for NHA, to C. B. s Co., Inc., 2 Lafayette St., New York, Y., **$1,454,400.** CD 2/26—ENR 3/4, under LB.

★ **†Pennsylvania** — Philadelphia Housing Auth., 21 St. and Parkway, Phila., tem- ary dwellings, Pa. 36253, for NHA, to ty & Fuhrman, Inc., 369 Lexington Ave., w York, N. Y., **$1,479,650.** Bid 2/26. 3/2—ENR 3/4 under LB.

†Pa., Tarantum — Federal Works Agency, Lafayette St., New York, N. Y., Allegheny lley Hospital addn., Pa. 36-902, to George Fuller Co., Munsey Bldg., Wash., D. C. . **$465,700.** Bids 2/20. CD 2/9—ENR 1.

†South Carolina—U. S. Eng., 33 Custom- use, Charleston, installing, furnishing re- geration equipment and insulation for cold rage bldg., Horry Co., to Piedmont Eng. rp., 322 W. Stonewall St., Charlotte, N. C., der **$50,000.**

†Texas—Pub. Housing Auth., NHA, 1309 ctric Bldg., Fort Worth, housing, ojects Tex. 41333 and Tex. 41334, to ill Singleton, Amarillo, **$261,235.** Awarded 23. CD 2/25—ENR 3/4, under LB.

★ **†Texas**—U. S. Eng., 231 W. Main St., Denison, bldgs., facilities, **Smith Co.,** to E. McKee, 1918 Texas St., El Paso. Est. **,000,000.** CD 3/2—ENR 3/4.

†Texas—U. S. Eng., Fort Sam Houston, dnl. facilities, Bexar Co., to Calvert & Watts, 2 Barrett St., San Antonio, under **$50,000.**

†Texas—U. S. Eng., Fort Sam Houston, dg., facilities, Kinney Co., to W. C. Evans, 30 Olmos Dr., San Antonio, under **$50,000.**

†Texas—U. S. Eng., 25 St. and Avenue F, alveston, frame bldgs., exten. underground ilities, Solic. 359-43-038, Tom Green Co., to m Handley, Inc., 720 Travis Bldg., San An- nio, **$100,000-$500,000.** Bids 2/27.

†Texas—U. S. Eng., San Antonio, temporary ame bldg., Bexar Co., to C. L. Browning, r., 812 Insurance Bldg., San Antonio, **$100,000- 500,000.**

†Utah—Pub. Housing Auth., NHA, Dierks ldg., 10 St. and Grand Ave., Kansas City, o., housing, Projects 42036 and 42037, to ym-Horman Constr. Co., 1514 Mill Creek Way, alt Lake City, **$468,045.** BA 2/17. CD 2/9— NR 2/4.

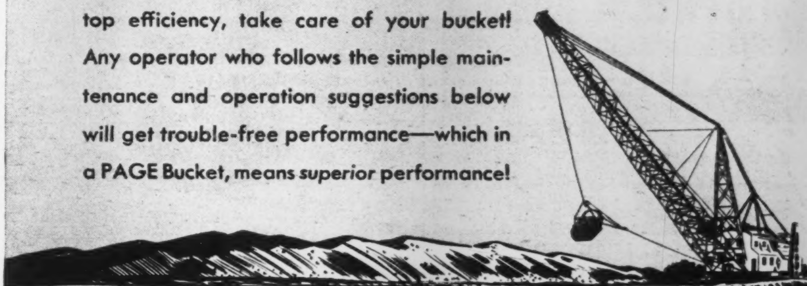
★ **†Va., Alexandria**—Federal Works Agency, 606 State Planters Bldg., Richmond, bldg. ddns., remodeling present Alexandria Hospi- al, to Davis, Wick, Rosengarten & Co., Inc., etropolitan Natl. Bank Bldg., Wash., D. C. 700,000. C. F. Neergaard, 41 E. 42 St., New ork, N. Y., and J. Posey, 10 E. Pleasant St., altimore, Md., engrs. CD 10/26—ENR 10/29.

★ **†Va., Norfolk** — Pub. Housing Auth., NHA, Temporary Bldg. 2, 19 and D Sts. N.W., Wash., D. C., 344 unit housing ccommodation for couples, Va. 44242 and 24 unit housing accommodations for couples, Va 44247, to A. Lloyd Goode Contr. Co., Chandler Bldg., Wash., D. C., **$889,200.**

TODAY'S EMERGENCY DEMANDS THAT YOU

Get the MOST Out of Your Present Equipment!

Your PAGE Bucket can stand the gaff day after day without asking favors . . . but to keep your Dragline *machine* operating at top efficiency, take care of your bucket! Any operator who follows the simple maintenance and operation suggestions below will get trouble-free performance—which in a PAGE Bucket, means *superior* performance!



GOOD MAINTENANCE IS ESSENTIAL TO PRODUCTION

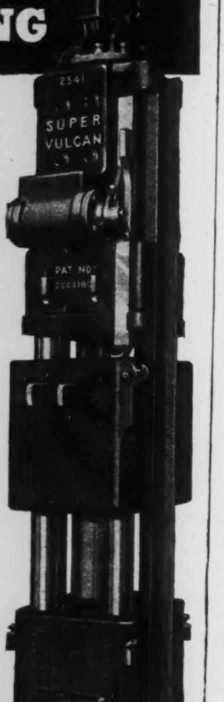
1. **CHAINS.** Chain life is shortened by uneven wear. Turn them over periodically.
2. **TEETH.** Sharp teeth are vital to fast digging. Renew points frequently.
3. **"PICK-UP."** Dragging the bucket after loading wastes time and causes excessive wear.
4. **CONTROL.** Help your operator prevent damage to bucket from uncontrolled dropping and jerking by keeping machine in adjustment.

Boost Production... Keep America Strong

PAGE
Automatic
DRAGLINE BUCKETS

PAGE ENGINEERING COMPANY • CHICAGO, ILLINOIS

VULCAN
PILE HAMMERS
Aid in America's Victory Drive
BECAUSE THEY
Speed Up
THE PILE DRIVING



The pile hammer shown here is a Super-Vulcan Open Type Available in Sizes 18c, 30c, 50c, 80c

This widely used pile hammer fits the same leads and uses the same accessories as the Vulcan Single-Acting Pile Hammers. This type too has been used for years —it delivers a moderate frequency of low velocity blows from a relatively heavy ram.

Get that important initial speed — get more piles down faster in such construction as for docks, industrial buildings, bomber plants, power plants, bridges. Write for bulletins.

VULCAN IRON WORKS
Since 1852
331 North Bell Avenue
Chicago Illinois

PUBLIC BLDGS. (Contracts Awarded, Cont'd.)

Bids 2/6 and 2/8 respectively. CD 2/1—ENR 1/28.

†Va., Norfolk—Pub. Housing Auth., NHA, Temporary Bldg. No. 2, 19 and D Sts. N.W., Wash., D. C., sites, utilities and community facilities, housing, Project VA-44254 (trailers to be furnished and delivered by FPHA), to Doyle & Russell and Wise Constr. Co., Central Bank Bldg., Richmond, cost plus fixed fee.

★ **†Washington**—Vancouver Housing Auth., Vancouver, temporary housing, Wash. 45173, for NHA, to Waale-Camplan Co., 730 S.W. 16 St., Portland, Ore., **$1,579,000 (Correction**—Project Number). CD 2/2—ENR 2/4 under CA.

COMMERCIAL BUILDINGS

PROPOSED WORK

Calif., Lakewood Village (R. sta. Long Beach)—Owner, c/o C. N. Aldrich, archt., 1834 Dawson Ave., Long Beach, sixty 6-room dwellings. Over $150,000.

Calif., Riverside—Owner, c/o C. N. Aldrich, archt., 1834 Dawson Ave., Long Beach, eighty 6-room dwellings. Over $150,000.

Md., Chevy Chase—Bradley Blvd. Constr. Co., 6701 Hillendale Rd., plans by Schreier & Patterson, 917-15th St. N.W., Wash., D. C. apartment.

Tex., San Antonio—Arthur Biard & Associates, Majestic Bldg., 5 and 6 room frame dwellings. $150,000.

CONTRACTS AWARDED

Conn., Stamford—Owner, c/o contractor, housing, Sumner and 6 Sts., to Neal Kelley, Riverside, Conn. Est. **$150,000.** Leo Hart, c/o contractor, archt.

Maryland—Colonial Gardens, Inc., 802 F St. N.W., Wash., D. C., three hundred fifty 1 story, frame residences, Sheriff Rd.-Chapel Oaks, Prince George's Co., to Bowles Constr. Co., 119 Williamson Rd., Roanoke, Va.

Md., Baltimore—Egnal Realty Co., c/o contractor, fifty-two 2 story, bsmnt., 27x28 ft. masonry construction residences, Berkshire Point Rd., to Lange Bros., 806 E. Belvedere Ave., **$250,000.**

Md., Baltimore—Marylyn Manor, Inc., 1600 Popland St., twenty-seven 2 story, part bsmnt., 28x40 ft. masonry apartment bldgs., Brooklyn section. Owner builds. **$270,000.** Hal. A. Miller, 421 St. Paul Pl., archt.

Md., Benesville—E. W. Martin, agent, 802 F St. N.W., Wash., D. C., 1 story frame housing, to Bowles Constr. Co., 119 Williamson Rd., Roanoke, Va. R. E. Archer, 215 Florida Ave., Wash., D. C., archt.

★ **Md., Laurel**—Edgehill Housing Co., 802 F St. N.W., Wash., D. C., 144 unit, 1 and 2 story housing, to Bowles Constr. Co., 119 Williamson Rd., Roanoke, Va. To exceed **$1,500,000.** R. C. Archer, 215 Florida Ave., Wash., D. C., archt.

Md., Mt. Rainier—H. A. Rosenfeld, 1429 Crittenden St. N.W., Wash., D. C., nine 2 story, brick, cinder block apartment bldgs., 38 St. between Bunker Hill Rd. and Shepherd St. Owner builds. J. T. Thoman, 1410 H. St., N.W., Wash., D. C., archt.

Md., Silver Spring—Miller's Inc., c/o J. T. Thoman, archt., 1410 H St. N.W., Wash., D. C., 7 apartment bldgs., Eastern Ave. and Blair Mill Rd., to Standard Contg. Co., 1010 Vermont Ave. N.W., Wash., D. C.

Md., Takoma Park—Hillwood Manor, c/o Ross & Walton, archts., Hyattsville, five 2 and 3 story, brick, apartment bldgs, to Davis & Platt, Inc., 7898 Georgia Ave., Silver Spring.

Mo., St. Louis County (St. Louis P. O.)—Risch Blvd. & Real Estate Co., 9100 Gravois Rd., 69 addnl. bungalows with attached garage, in Mackenzie Park subdivision on Mackenzie Rd. Owner builds. CD 8/13—ENR 8/20.

N. J., Elizabeth—Eppo Developers, 2301 Summit Terrace, Linden, eighteen 2 story, bsmnt., concrete block, brick residences, separate contracts. **$153,000.** S. Pelton, 47 Elm St., archt.

★ **N. Y., Watertown**—R. H. Bailey Homes, Inc., 24 Flower St., 102 homes Watertown Suburban Estates, to Triangle Engr. Co., 101 Park Ave., New York. Est. **$500,000.** W. Pember, 24 James St., Albany, archt.

O., Cleveland—S. & S. Constr. Co., c/o Peter Sepper, 17504 Narragansett Ave., masonry and carpentry work for thirty 5 room frame houses. Est. **$150,000.** Owner builds.

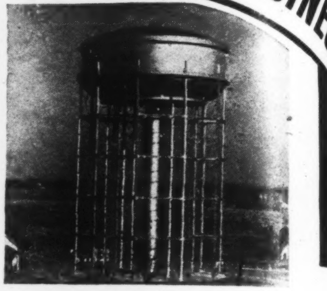
Tex., Fort Worth—M. M. Moseley, 4224 Pershing St., seventy-one 1 story, 38x40 ft. frame dwellings, force account. **$325,000.**

INDUSTRIAL BUILDINGS

PROPOSED WORK

Calif., Alameda—SHOP, etc.—United Engineering Co., foot of Main St., soon lets contract, 2 story, 60x200 ft., frame sheet metal shop, drafting room and women's locker room bldg. $75,000.

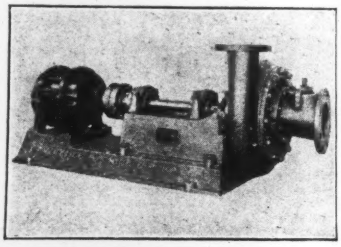
PITTSBURGH• DES MOINES



ELEVATED STEEL TANKS
Our engineering cooperation in the preliminary studies of your needs, and complete construction estimates, will gladly be furnished on request —without obligation. Write for detailed, descriptive Bulletin No. 101.

PITTSBURGH-DES MOINES STEEL COMPANY
Pittsburgh, Pa. . . . 3414 Neville Island
Des Moines, Ia. . . . . 915 Tuttle Street

LAWRENCE PUMPS
SEWAGE AND SLUDGE PUMPS
ENGINEERED TO YOUR JOB



NO CLOGGING— not even big solids!

The "Lawrence" Non-Clogging Sewage and Sludge Pump combines modern design with practical experience of many years building material handling pumps of all kinds such as Dredging, Sand and Gravel Pumps, etc. This experience is particularly valuable when dealing with sewage and sludge containing rags, trash, fibrous material, grit and even large solids. The pump illustrated combines the ability to handle these materials easily together with simplicity, ruggedness and high mechanical efficiency.

The "Lawrence" Non-Clogging Pumps are made both horizontal and vertical in sizes from 4" to 24" inclusive.

Bulletin 206 ●

LAWRENCE
MACHINE AND PUMP CORP.
369 Market Street Lawrence, Mass.

RIAL BUILDINGS (Proposed Work, 'd.)

Alameda — POWERHOUSE, etc. — Eng. & Drydock Co., foot of Schiller ory, rein. con. powerhouse and frame or bldg.

Oakland — PLANT — Albert Milling 2700 7 St., rebuilding plant, main mill, elevators and Albers dock. $2,500,000.

Woodland—PLANT—Weaver Tractor nd T Sts., Sacramento, plans by H. J. Cronan Bldg., Sacramento, machinery ldg. $50,000.

Waterloo—FACTORY—Hawkeye Steel Co., 324 Duryea St., rebuilding fac- 50,000, incl. equip.

olumbus—WAREHOUSE — Trowbridge Co., 422 E. Rich St., 5 story, 100x150 house. Over $40,000.

arral (mail Strasburg) — TUNNEL Robinson Clay Products Co., W. E. n, pres., Second National Bldg., tunnel kiln. $40,000 or more.

Athens—FACTORY—Athens Chair Thompson, pres., Athens, factory addn.

Memphis — SUBSTATION—Memphis Gas & Water Div., c/o Col. Thos. H. h. engr., Madison and 3 Sts, electric on. $40,000-$50,000.

Dallas — FREIGHT STATION—Mis- Kansas, Texas R.R. Co. of Texas, F. ch. engr., Katy Bldg., Dallas, re- freight station.

Gainesville—TRUCK REPAIR SHOP ey Mill & Elevator Co. (subsidiary -Diamond Milling Co., 2200 S. Main rt Worth), truck repair shop and ele- nit. Over $40,000.

McAllen—PLANT—Gilbert C. Wilson ciates, Denton, construction equipping potato dehydration plant. $40,000.

Kenosha — STORAGE — Dynamatic 3307 14 Ave., 1 story, 40x100 ft., con- lock storage bldg.

C., **Vancouver**—PLANT—Universal Box d., 7 Heather St., plans by Architect, Koerner, Alaska Pine Co. Ltd., New inster, plant. $50,000.

C., **Victoria**—FACTORY—Fraser Valley Flax Co-Operative Assn., c/o Hon. M. nald, Minister Agriculture, Legislative flax factory. $85,000. CD 12/14— 2/17.

ASKED

Bids Asked Within 3 Weeks

Montreal—PLANT—E. J. Turcotte, 1010 St. Catherine St. W., 1 and 2 plant addns., alterations, for Canadian & Whitney Co. Ltd., 150 Lorne St., euil. **$50,000.**

Bids Asked

Troup—PLANT—General Refractories Real Estate Trust Bldg., Phila., Pa., 0 ft. brick main bldg., main kiln 500 ng and several smaller kilns, etc. 00. **CD 2/18—ENR 3/4.**

RACTS AWARDED

f., **Berkeley**—LABORATORY, etc.—Re- University of Calif., Berkeley, labora- ldg., storehouse, sheet metal shop, alter- aboratory and shop bldg. for Cyclotron t, to J. E. Branagh, 105 Sheridan St., mont. Est. **$70,000.**

n., **Bridgeport**—MILL, etc.—A. W. Bur- Lumber Co., 415 Knowlton St., rebuilding ry office bldg., South Mill, North Mill, etc., Grand and Knowlton Sts. Owner

n., **Putnam** — FACTORY — Empire Fin- Steel Corp., 63 Canal St., 1 story, 60x180 rick factory addn., incl. crane runway. r builds. **$40,000.** L. F. Caproni, 1221 el St., New Haven, engr.

l., **Joliet**—PLANT—American Steel & Wire Co., 208 S. La Salle St., Chicago, al contract 1 story, brick, rein.-con. , alterations, Rod Mill 3, to Sumner S. t Co., 307 N. Michigan Ave., Chicago. cost **$15,000,000. (Correction**—contrac- address). CD 2/23—ENR 2/25 under CA.

assachusetts — PLANT — Bethlehem Steel 97 E. Howard St., Quincy, 1 and 2 story, ular sized, brick, precast concrete com- ion bldg., to McCutcheon Co., 250 Stuart Boston. Est. **$40,000.**

ass., Cambridge—FACTORY—C & W Tool 19 Chestnut St., altering factory, 89 y., to George Pigott, 11 George St., Hyde . Est. **$40,000.** E. Putnam, 107 Mass. , Boston, archt.

ass., Dorchester (sta. Boston)—FACTORY o. Lawley & Sons Corp., 76 Ericsson St., ry, 130x400 ft. factory, Walnut St. Owner ds. J. Worcester & Co., 79 Milk St., on, engr.

ass., Dorchester (Sta-Boston)—PLANT— el Press Mfg. Co., Dorchester Ave., exten- alterations brick plant, Dorchester Ave., McCreery & Theriault, 131 Clarendon St., on. Est. **$70,000.** Cleverdon, Varney & , 46 Cornhill, Boston, archts.

ass., Malden (br. Boston) — MACHINE OP—Lawson Machine & Tool Co., 131 hange St., converting 3 story, 50x136 ft. k, concrete structure into machine shop, Mountain Rd., to J. Gascoigne & Co., , 8 Beacon St., Boston. Est. over **$40,000** equip. W. J. Freethy, 69 Pontiac Rd., wton, archt.

THIS IS THE
payoff

AMERICAN Quality pays extra dividends in times like these. When new machines are not to be had old ones with an extra long service life built into them really pay off.

The demands of total war have made it impossible for us — like all other machinery manufacturers — to supply equipment for non-war purposes, but to owners of AMERICAN equipment we extend the assurance that we can still do much to help them keep their sturdy AMERICAN machines delivering a full day's work every day.

As long as the war lasts every piece of AMERICAN Equipment is literally priceless. Regular care and attention will keep it functioning at full efficiency.

AMERICAN

STEEL STIFFLEG DERRICKS

A good part of industry's heavy handling work is shouldered every year by AMERICAN Steel Stiffleg Derricks — Medium and Heavy Duty types. Many of these derricks have spent years on exacting jobs and are still going strong — a convincing demonstration of rugged efficiency.

We are anxious to help our good friends get the utmost service from the AMERICAN Derricks they now have and to that end we welcome an opportunity to help them keep their AMERICAN Derricks performing efficiently.

AMERICAN HOIST & DERRICK CO.
SAINT PAUL, MINNESOTA
CHICAGO • SAN FRANCISCO • NEW YORK
AMERICAN TERRY DERRICK CO. . . . South Kearny, N. J.

SIXTY YEARS OF SAFETY
1883 1943
The Genuine
CROSBY CLIP

For "the duration" our boat-building facilities are 100% government. Our foundation and dredging facilities are still available for commercial use.

BULKHEADS
PILEDRIVING
WHARF CONSTRUCTION

DELAWARE BAY
SHIPBUILDING CO., INC.
LEESBURG, NEW JERSEY

Foundation TESTS of
UNDISTURBED
SOIL
in its natural state, position, condition and ASSOCIATION with the
Le Mieux
TRITOMETER
SUBSTRATA ENGINEERS, INC.
Maritime Bldg. *New Orleans, La.*

WYTEFACE
"A"
TRADE MARK
STEEL TAPES

K&E
REG. U. S. PAT. OFF.
I'LL TAKE THE WHITE ONE EVERY TIME!
3
4

GRADUATED IN INCHES OR TENTHS

EASY-TO-READ, *raised* black graduations on crack-proof white surface . . . resist abrasion from rock, sand, scraping over rails, pipe, concrete, etc. In all sizes and types—in cases or reels. Ask your dealer—or write for catalog.

EST. 1867
KEUFFEL & ESSER CO.
NEW YORK • HOBOKEN, N. J.
CHICAGO • ST. LOUIS • SAN FRANCISCO • LOS ANGELES • DETROIT • MONTREAL

INDUSTRIAL BLDGS. (Contracts Awarded, Cont'd.)

Mich., Alma—PLANT—Swift & Co., Alma, food processing plant, to Barnes Constr. Co., 1310 Chicago Ave. S. W., Grand Rapids. Est. **$55,000.**

★ **Mo., St. Louis**—WAREHOUSE, etc.—Central Terminal Co., 720 N. 12 Blvd., alterations, remodeling 7 story warehouse and office bldg., 720 N. 12 Blvd., to Dickie Constr. Co., 317 N. 11 St. Est. over **$600,000.** Spearl, Becker & Falvey, Arcade Bldg., archt.

N. J., Belleville—BOILER HOUSE—Wallace & Tiernan Co., 11 Mill St., 1 story boiler house exten., incl. new brick stack, to Mahony-Troast Corp., 657 Main Ave., Passaic, **$40,000.**

N. J., Jersey City — FACTORY — Western Electric Co., 100 Central Ave., Kearny, repairing, altering brick mfg. bldg., to Hugh Montague & Sons, 880 Bergen Ave., Jersey City, **$40,000;** electrical work to E. J. White, 351 Bway., Newark.

N. J., Newark—FACTORY—A. Hollander & Sons, 143 E. Kinney St., new fdns. and underpinning present factory bldg., to Underpinning & Foundations Co., 155 E. 44 St., New York, N. Y., **$41,000.** Abbott Merkt & Co., 100 E. 40 St., New York, N. Y., engrs.

N. J., Perth Amboy—FACTORY—Kincaid Mfg. Co., 17 E. 42 St., New York, N. Y., 1 story, 60x250 ft. rein.-con., steel and glass brick factory addn., to Walter Kidde Const. Co., 140 Cedar St., New York, N. Y. **$75,000.** CD 3/2—ENR 3/4.

O., Cleveland—FACTORY—Hickok Electric Instrument Co., R. D. Hickok, pres., 10514 Dupont Ave., 2 story, 45x100 ft. factory addn., to R. E. Nixon Co., 1737 Euclid Ave. Est. **$40,000.** CD 2/19—ENR 2/25.

Tenn., Nashville—WAREHOUSE, etc.—T. C. Ragland Co., c/o Manager, 158 1 Ave. S., Nashville, rebuilding 1 and 2 story, brick warehouse and offices, to V. L. Nicholson, Nashville Trust Bldg. Est. **$75,000.** G. D. Waller, 3d Natl. Bank Bldg., archt.

Utah, Salt Lake City—PLANT—Utah Fire Clay Co., L Squires, genl. mgr., 1078 S. 1st West St., rebuilding parts plant, to Young Const. Co., 1st National Bank Bldg., **$66,300.**

Wis., Milwaukee — FOUNDRY — Ampco Metal, Inc., 1745 S. 39 St., 1 story, 80x260 ft. concrete block foundry addn., concrete fdn., to Wm. Keierleber Constr. Co., 1732 N. 35 St.

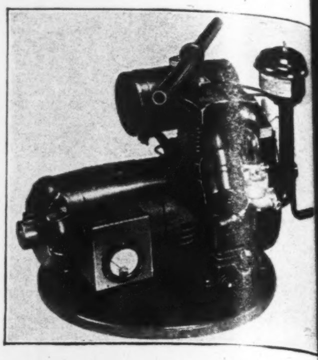
Wis., Oshkosh—FOUNDRY—Universal Foundry Co., 61 Pine St., 1 story, 50x100 ft., concrete block, frame foundry addn., concrete fdn., to Ben B. Ganther Co., 78 State St.; electrical work by owner.

POST WAR PROJECTS

ROADS

†**Alabama**—Public Roads Admin., FWA, 515 14 St. N.W., Wash., D. C., approved 4.5 mi. new route between point southeast of Centerville and point northwest of Brent, involving route around Centerville and new bridge over Cahaba River; relocating 18 mi. for U. S. Route 31, on more direct alinement between point 3 mi. south of Greenville and Davenport; 14 mi. for U. S. 78, from point about 11 mi. west of Anniston via Coldwater Gap to point east of Oxford, involving alternate route around Anniston and Oxford; 20 mi. hy. for U. S. Route 31 on more direct alinement between point near Cullman and Hartselle; 22.8 mi. new route between Bessemer and Roebuck, involving alternate route around Birmingham on south and east; 22 mi. new route between Bessemer and Roebuck, involving alternate route around Birmingham on west and north; relocating 11 mi. for U. S. Route 231 on more direct alinement passing near Dothan on west; 6 mi. new route on more direct alinement around Dothan on south; 8 mi. new routes around Huntsville on north, west and east; relocating 13.5 mi. on more direct alinement of U. S. 90, between Theodore and a point on Government Street in Mobile; 9.5 mi. U. S. 43 between point near Prichard and point near Navco, passing Mobile on west; 17 mi. new route between point on U. S. 80, east of Montgomery southerly, westerly and northerly to point on U. S. 31, passing near Montgomery on east, south and west; 14.5 mi. new route on more direct alinement between point on U. S. 80, near Moscow and point near Cuba, passing near Livingston; relocating 35 mi. on more direct alinement of U. S. 11 between point southwest of Tuscaloosa and Bucksville and passing near Tuscaloosa on south; imprv. 15 mi. U. S. 231 between Orion and point southeast of Troy and passing near Troy on west.

†**California**—Public Roads Admin., FWA, 515 14 St. N.W., Wash., D. C., four projects involving completion Bayshore Freeway from San Francisco-Oakland Bay Bridge on west side of San Francisco Bay via San Mateo, Redwood City, Moffett Field and San Jose to connect with present route southeast of San Jose, plans for 9 mi. of this route are already completed by State and new work covers 42 mi.; 33 mi. new limited access hy. from point on High St. in Oakland, along east shore San Francisco Bay to connect with the proposed Bayshore Freeway, north of San Jose, to be known as Eastshore Freeway and will bypass congested urban and industrial areas; 5 projects, 45.5 mi. development of freeway from near Universal City through business section of Los Angeles southeasterly to Irvine; developing 26 mi. Sepulveda Blvd. from Northwest of San Fernando to Centinella Blvd. south of Culver City; 4 mi. freeway from American River to Ben Ali northeast of



PORTABLE GENERATOR SETS
Capacities 650 watts to 15000 watts

Master offers 21 Standard sizes of continu-ous-duty, ruggedly-built, gas-powered Gen-erator Plants, to furnish power for lighting, saws, tools and Master Electric Vibrators, and other standard electrically powered equipment, within the scope of a given Generator size.

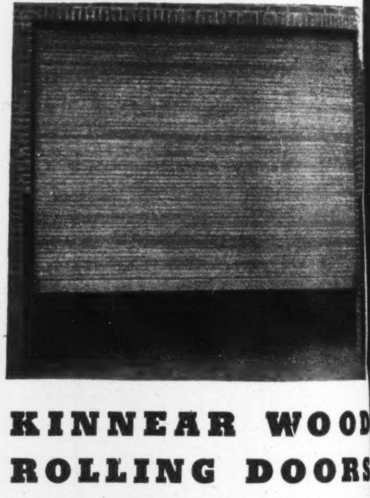
MANUFACTURERS OF
- Gas-Electric Generator Plants, 650 Watts 9400 Watts—AC or DC
- "Big 3" Gas-Electric Power Units, for Electric Generation, Concrete Vibration & Tool Operation.
- Concrete Vibrators—Gas or Electric.
- Concrete Surfacing Attachments.
- Master Power Blow Hammers & Tools.
- Complete Line of High Speed Tools.

Master Distributors throughout United States and Canada. All Foreign territories—Armco International Corporation.

Send for #528 Bulletin today.

Master Vibrator Co., Dayton, Ohio

For wartime duplication
steel rolling door efficienc



KINNEAR WOOD
ROLLING DOORS

Smooth, easy operation . . . an interlapping-sl curtain that coils out of the way, safe from da age . . . maximum savings in floor, wall a ceiling space . . . full weather protection . . . choice of motor or manual control! Kinnea WOOD Rolling Doors duplicate *all* these adva tages of the Kinnear Steel Rolling Door, wi *maximum savings in war-vital steel!* Any siz Write for bulletin 37! The Kinnear Mfg. Co 1820-40 Fields Ave., Columbus, Ohio.

SAVING WAYS IN DOORWAYS
KINNEAR
ROLLING DOORS

WAR PROJECTS (Roads, Cont'd.)

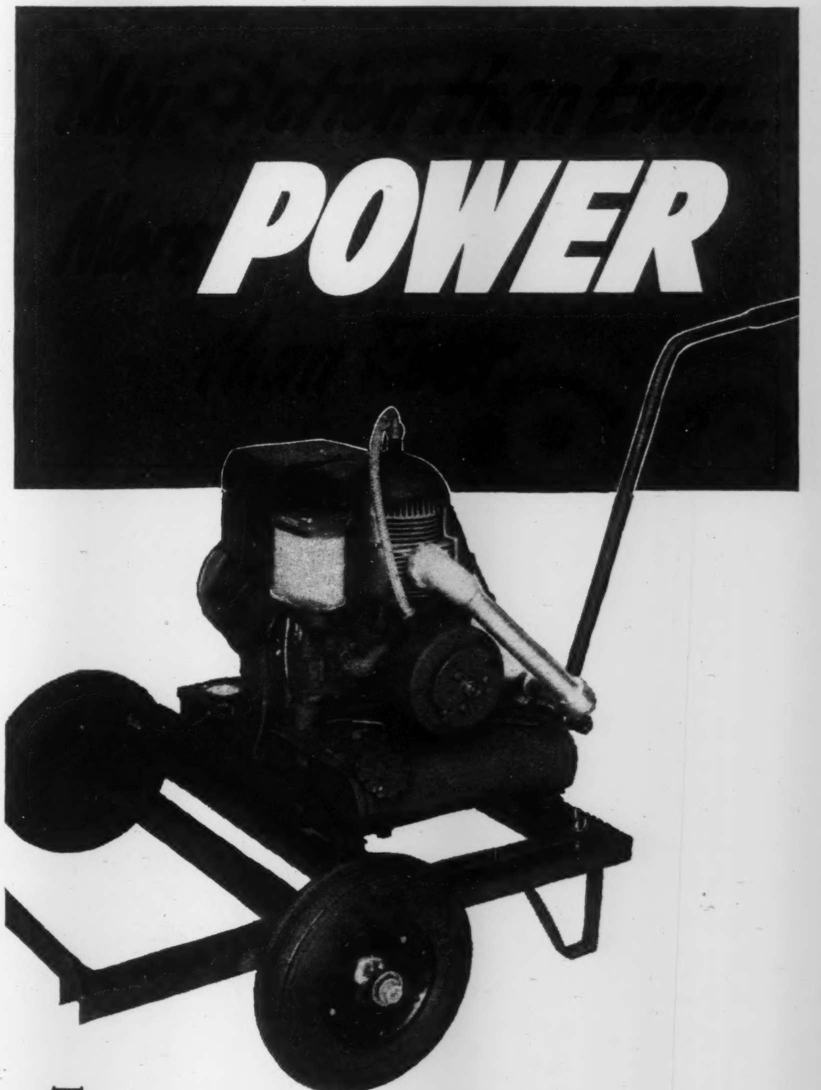
ento; 3 projects, 18.6 mi. freeway from
d of Oakland-San Francisco Bay Bridge,
Oakland and Richmond to Carquinez

rict of Columbia—Public Roads Admin.,
515 14 St. N.W., Wash., D. C., trunk hy.
entral area of Washington, vicinity of
K Sts. N.W., to northeastern sect. and
connection with U. S. 1 to Baltimore at
H Sts. N.E., a section of route is
vely planned as depressed hy.; master
or development Rock Creek and Poto-
kwy. from near Massachusetts Ave. to
ction of Blagden Ave. and Broad
Rd. to provide connection between
hys. east and west of Rock Creek

ho—Public Roads Admin., FWA, 515
N.W., Wash., D. C., 2 projects, 5 mi.
h route in vicinity of Boise, providing
ernate route around city proper on north
sidential and airport areas on south in-
g 3 grade separation structures, 2 canal
gs and connections to existing routes;
ects, 13 mi. for development new routes
inity of Pocatello, involving alternate
round city on east and north; 30 mi. new
which may connect on east with both
30 North and U. S. 30 South, requiring
ridge over Snake River, passing approx.
ay between Rupert and Burley, to con-
with U. S. 30 North, near Minidoka-
e Co. line; 2 projects, 5.5 mi. in vicinity
ur d'Alene, passing around city on east,
and west, involving number railroad
gs and river bridge; 27 mi. new route
en Craigmont on U. S. 95 and Culdesac
rtle on Snake River in order to avoid
ac Hill and secure easier curves on
; 2 mi. new crossing of Clearwater River
wiston involving railway grade separa-
and adequate connections with present
ed routes; relocating 7 mi. for U. S. 10
en Wallace and Mullan, involving fitting
hy. and railway facilities into deep nar-
river canyon; 18 mi. U. S. 30 on more
alinement between Lava, Hot Springs
Alexander; 3 projects, 8 mi. new route
en point on U. S. 95, at Algoma and
on U. S. 95 north of International Rail-
Crossing north of Sandpoint involving
bridge over Pend O'Reille Lake.

nois—Public Roads Admin., FWA, 515
N. W., Wash., D. C., 87 mi. new route
Wisconsin state line at Beloit to Mar-
and further development existing route
Marengo to intersection Congress St. and
Shore Dr. in Chicago; 16 mi. new route
Wisconsin State line near Beloit, passing
Rockford and Camp Grant to south of
ord; 7 mi. route from junction U. S. 6
. S. 150 at Moline Airport to Centen-
Bridge over Mississippi River at Rock
; 20 mi. new route from Rock Falls to
s-Iowa state line near Clinton, Ia.; 2 mi.
route across Illinois River from North
ington St. and Hamilton Blvd. in Peoria
Washington St. near junction of U. S.
d U. S. 150 in East Peoria; relocating
. U. S. 45 between Neoga and Mattoon
nprove alinement; 7 mi. new route
h Springfield, via 3 St.; 55 mi. new
between Casner and Springfield or
r development existing route; relocating
road between Jacksonville and Barry
view to providing more direct route;
ting 10 mi. U. S. 45 to pass near
ham on east; relocating 10 mi. U. S. 51
ss near Centralia on east; 14 mi. new
from point west of Alton, to connection
other routes southeast of Alton; relo-
or developing 30 mi. U. S. 66 from
to East St. Louis; 11 mi. new route
Brighton to point near Alton State Hos-
modernizing and relocating 12 mi. U. S.
om Maryville to Illinois-Missouri State
at East St. Louis, incl. new bridge over
sippi River; 20 mi. U. S. 41 from Lake-
Co. line to Lake Shore Dr. in Chicago;
ping 6 mi. Outer Dr. from Jackson
in Chicago to Illinois-Indiana State
imprv. 17 mi. U. S. 66 to modern stand-
from point 2 mi. west of Cook-DuPage
ne to Lake Shore Dr. in Chicago; 22 mi.
direct route from Richton Park at U. S.
Lake Shore Dr. in Chicago; 63 mi.
45 from Frankford on U. S. 30 to U. S.
rth of Gurnee; modernizing 7 mi. exist-
oute and selection new route from Silvis
tersection 7 Ave. and 11 St. in Rock
d.

nsas—Public Roads Admin., FWA, 515
N. W., Wash., D. C., relocating 14 mi.
54, east and west through Wichita;
. 37.5 mi. U. S. 81, incl. some reloca-
between Salina and Concordia; relocating
i. U. S. 69, between point near Merriam
of Kansas City and Kansas-Missouri
line; imprv. 27 mi. U. S. 81, incl. some
tion, between Concordia and Kansas-
ska State line; relocating 16.3 mi. U. S.
etween point southwest of Olathe and
am; further development 5 1 mi. U. S.
rom Merriam southerly; 6.5 mi. new
around McPherson on west; 4 mi. around
on on east; 6 mi. around Newton on
and 4.5 mi. around Newton on south;
ating 19 mi. U. S. 24 between Tonganoxie
a point east of Topeka, passing near
ence; relocating 12 mi. on more direct
ment between Meriden and Valley Falls;
i. new route between U. S. 50 southwest
ansas City and U. S. 24 to serve as
nate route around Kansas City on west;
i. new route passing around Junction
on west; 52 mi. new route on more
alinement between point west of To-



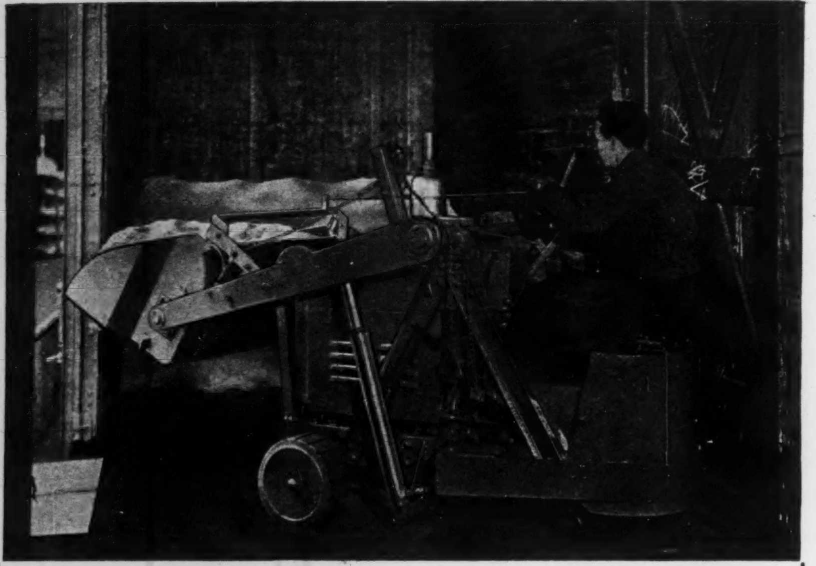
The war has got us more than ever on the alert. New and better Homelite Generators—more portable, more powerful than ever—are daily rolling off our assembly line and going direct to our Armed Forces.

In design, in performance, and in the number of different units, Homelite has made tremendous forward strides. It doesn't mean much to you now—but after the war, your new Homelite Portable Pumps and Generators will be better performers than ever before.

★ ★ ★

ARMY
E
NAVY

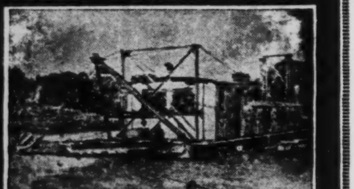
Homelite workers have done their job well enough to earn the Army-Navy E—a good indication that they'll do their job well enough to meet your demands when peace is finally declared.



If you're unloading boxcars you need a CARSCOOP

If you have a difficult handling problem, check on the CARSCOOP — the fastest cheapest method for unloading bulk cement from boxcars. Write today for complete literature.

BUTLER BIN COMPANY
WAUKESHA WISCONSIN



DREDGES
HYDRAULIC ★ DIPPER
DERRICK BOATS
HULLS - BARGES - SCOWS

AMERICAN STEEL DREDGE CO., INC.
Fort Wayne, Ind.
Write for Bulletin RD-102

STERLING QUALITY
STERLING
LIGHT PLANTS
YOU'LL GET BETTER RESULTS WITH STERLING
• WRITE FOR LITERATURE
Simple, Dependable, Rugged—the choice of contractors everywhere.
STERLING
MACHINERY CORP.
405-13 Southwest Blvd. Kansas City, Mo.

COMPLETE WELL POINT SYSTEMS
IMMEDIATE STOCK SHIPMENTS
Rentals or Sales
19 YEARS of Loyal Service to the Construction Industry is our "Best Sales Talk"
ORGANIZATION • EXPERIENCE • RESPONSIBILITY
Serviced and Sold by One of the Largest Organizations of Its Kind
COMPLETE
Machinery & Equipment Co., Inc.
MAIN OFFICE AND PLANT
LONG ISLAND CITY, N. Y.
Phone Ironsides 6-8600
Branch Warehouse: Gary, Ind. Office: 125-168 St., Hazelcrest, Ill. Phone: Harvey 2912

peka and point east of Fairview; 4.2 mi route passing around Newton on west; locating 37 mi. U. S. 69 on more direct a ment between point south of Fort Scott point near Trading Post; 13 mi. U. S. 66 tween Baxter Springs and Galena; 16 north and south route between Kansas-Ok homa State line near Caney and point w of Independence; 17.5 mi. new location U. S. 77, between point near Barnes Kansas-Nebraska State line; relocating 12 U. S. 81 north and south through Wichita

†Kentucky—Public Roads Admin., FW 515 14 St. N. W., Wash., D. C., develop 50 mi. road to modern standards of U. S. between Florence and point 10 mi. south Corinth; 45 mi. new route from Louisville Shepherdsville to Elizabethtown; relocat 12 mi. U. S. 60, passing near Olive Hill; 6 alternate routes around Hopkinsville on m east and west and north and south rou relocating 3 mi. U. S. 6, passing north Winchester; imprv. 30 mi. U. S. 25 betw Georgetown and Lexington, with belt around Lexington; 2 mi. alternate ro around Frankfort on south connecting w U. S. 60; relocating 3 mi. U. S. 31-W, pass to west of Elizabethtown; 2 mi. spur fr U. S. 119 into Harlan; relocating 8 mi. U 41, passing Madisonville and Earlington, east; 35 mi. new route serving as belt around Louisville, on east and south; devel ing 2 mi. U. S. 25 from south corporate lim of Covington to Ohio River Bridges; reloc ing 30 mi. U. S. 25-E on more direct ali ment between London and Barbourvill further development 15 mi. U. S. 25 and relocate on more direct alinement betw Berea and London; developing 7 mi. ne location to serve present U. S. Routes 60, and 68 as bypass of Paducah on south; locating 3 mi. U. S. 23, passing east of Pik ville.

†Louisiana—Public Roads Admin., FW 515 14 St. N. W., Wash., D. C., widenin relocating 20 mi. U. S. 80, entirely acro Bienville Parish between Minden and Rusto 17.9 mi. U. S. 80, between Louisiana-Tex State line and Shreveport; 15.6 mi. U. S. entirely across Webster Parish and to bypa Minden on south; 10.5 mi. U. S. 80, betwe Arcadia and point near Grambling; 3.8 m U. S. 80, from Market and Texas Sts., Shrew port, easterly; 14.9 mi. U. S. 80, betwe Bossier City and Minden; 4.5 mi. U. S. 8 between point near Grambling and Rusto widening, straightening 3.6 mi. Bayou Sa Rd. within and north of Baton Rouge; wide ing, relocating 15.6 mi. U. S. 90 between La Charles and Iowa, incl. near route throu north part of Lake Charles involving brid over Calcasieu River; 6 mi. U. S. 190, betwe Lawtell and Opelousas; 7.8 mi. U. S. 190 pass near Opelousas on south; relocating 7 m U. S. 51 to pass near Hammond and Ponch toula on west; 9.4 mi. new route betwe U. S. 90, southwest of New Orleans and Sta Route s.e. of Gretna; bridge, approaches 0.5 mi. new location at Plaquemine Bayou.

†Maine—Public Roads Admin., FWA, 5 14 St. N.W., Wash., D. C., 14 mi. alterna route around Augusta on west and nort 7 mi. alternate route around Winslow, i volving new crossing of Sebasticook Rive imprv. 22 mi. U.S. 202 in 3 separate se tions between Maine-New Hampshire Sta line at Rochester and Gray Corner; projects, 9 mi. for alternate route aroun Freeport Village; relocating 3 mi. U.S. involving causeway across tidewater b tween Machias and East Machias; 1 mi. a ternate route around village of West Pem broke; relocating 3.7 mi. in Pembrok Village to avoid dangerous alinement.

†Massachusetts — Public Roads Admi FWA, 515 14 St. N.W., Wash., D. C., de veloping 24 mi. new route between Wake field and Wellesley passing to north an west of Boston; 15 mi. new inland rout beginning near Danvers, passing to the we of Gloucester and extending to point nea Rockport; 29.5 mi. new route north of U.S 20 from Brimfield-Monson town line, t point near Russell-Westfield town line.

†Mississippi—Public Roads Admin., FWA 515 14 St. N.W., Wash., D. C., 2.5 mi. alte nate route for U.S. 45, passing to the we of Corinth; 8 mi. new route beginning Jackson and running northeast providin more direct travel than U.S. 51; 3.5 m alternate route for U.S. 51, passing to th west of Terry; relocating 7 mi. U.S. 8 passing near Bolton and Edwards and i volving separation of grades with Al bama and Vicksburg Railroad; 9 mi. ne location of U.S. 11, 45 and 80, throu Meridian, 3.5 mi. alternate route for U.S. south of Albany.

†Nevada—Public Roads Admin., FWA, 5 14 St. N.W., Wash., D. C., 50 mi. alterna route around Reno and Sparks and dis routes in vicinity; 30 mi. alternate rou around Las Vegas and distribution routes.

†New Hampshire—Public Roads Admi FWA, 515 14 St. N.W., Wash., D. C., 15.5 m new route lying west of U.S. 1 betwe Portsmouth and New Hampshire-Massach setts State line, near Seabrook; 8.9 mi. ne route around Concord on east and north; mi. new route around Manchester on we side of Merrimack River on west.

For Proposal Advertisements see p. 221

EN

NI

Po